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Public Policy, Technology and Lived Experience: Three Case Studies of Technology in Support of Urban Transport Policies in London

by

Philip Inglesant

A thesis submitted in partial fulfilment

of the requirements for the degree of

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Declaration

I, Philip George Inglesant, hereby declare that the following thesis is my own work.

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Abstract

High-quality public services can support policy outcomes in many areas of government; this thesis focuses on public policy in transport. An essential factor, often overlooked, is the *usability* of public services. Usability is crucial to e-government, both because quality of service is a public value, and because poor public perception of services may weaken policy acceptance.

However, usability, as developed in the Human-Computer Interaction research tradition, has not been prominent in the theory or practice of public policy. This is a critical shortcoming, since policy decisions inscribed in e-government systems have implications for the lived experience of transport users.

Actualising this critique, the history of the HCI concept of usability is traced, and related to research traditions which deepen understanding of the inter-relations between technology and the social. This leads to a view that usability is meaningless outside the *lived experiences* of system users. This goes beyond the "user experience" with technology, because people *live with* technology as it becomes increasingly intertwined with everyday situations.

This thesis makes its contributions from three case studies in urban transport. Semi-structured, recorded interviews and focus groups with 126 transport users were held alongside over 100 public policy documents and interviews with 25 key post-holders, and laboratory and situated observations.

The insights of phenomenology, dialogism and pragmatic philosophy provide a route to understanding experiences with technology. A qualitative analysis based on Grounded Theory and Discourse Analysis is developed and used to illuminate these lived experiences. The embodied-ness of inter-actions with technology is investigated from an ecological perspective of affordances and genres.

As service users freely mix electronic and non-electronic artefacts to meet real-life needs, the contingency of their actions calls into question a simple model of cognitive or institutional schemata; this has profound implications for electronic systems in support of public policy aims.

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It is with great pleasure and appreciation that I am able to thank the many people who have given their time, thought, and energy to helping me throughout my PhD research.

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It would be easy to overlook my informants, many of whom gave their time freely in interviews and other ways. In particular in this category I include members of staff of Transport for London, London TravelWatch, the Greater London Authority, the Lambeth Public Transport Group, the Association of London Government, and others, whose openness is an example to all public service providers.

I am fortunate in counting as friends several who have trodden this path before. In particular it gives me special pleasure to thank Stuart Gibson, who proof-read several chapters as well as giving constant support and advice. I am also indebted to my colleagues at UCL, for their willingness to comment on drafts and for informal discussions across the desk. In no particular order, I am thinking particularly of Simone Stumpf, Philip Bonhard, Hina Keval, Sven Lacqua, Jens Riegelsberger, Hendrik Knoche, and Brock Craft, and Dave Elder-Vass at Birkbeck.

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And above all I give my most heartfelt thanks to Christian Laflamme, for practical help, from cooking and housework to proof-reading, and for support and encouragement without which I could not have embarked on this road and certainly would not have reached completion.

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Chapter 1

Introduction:

Public policy, Technology and Lived Experience

The use of information systems in support of public policy outcomes has been essential for government since at least the 1960s, yet this use is still constantly changing and moving into new areas. Computers themselves have changed from huge mainframes to dynamic networks; interactions with computers, which once relied on punched cards and consoles requiring trained operators, are now made through a constellation of consumer devices.

These developments run in parallel with movements in the ways in which, and the places *where*, computers are encountered. While once they were encountered, if at all, in specialised environments in the workplace, now they are near-ubiquitous devices which form part of the background to daily living so that today we "*don't just use technology; we live with it*" (McCarthy & Wright 2004:ix).

Electronic Government (e-Government) has followed these movements so that, as well as important functions within and between government organisations, it is also increasingly part of the lived experience of citizens and users of government services. Electronic government strictly speaking includes all parts of government which make use of information technology (Margetts 2003). However, it is only since the mid-1990's that the potential for electronic communication across government, and especially between government and citizens, has been realised. This realisation has changed the emphasis from economies of *scale* to economies of *scope* in "*information-age government*" (Bellamy & Taylor 1998), signalled by the public profile of discussions such as that around the government.direct Green Paper (Office of Public Service 1996).

1.1 Living with technology

A man runs into a late-night convenience store. It is five-to-ten on a weekday evening. On the door the "PayPoint" logo tells him that here is a place where he can pay the Central London Congestion Charge. He has run from the service station two hundred metres away where his car is parked and where, on every other working day, he pays the charge, always before 10pm, to avoid the additional cost of late payment. But today the payment machine at the service

> station is broken. With evident relief, he inserts his Fast Track card into the payment machine on the counter and, two minutes before the deadline, receives the printed slip confirming his payment at the standard rate for the day.

1.1.1 Technology and government

Although information technology was already entrenched in the internal workings of government bureaucracy, the coming of the Internet in the 1990s intervened in relations between government and citizens, as the potential for government interactions with the outside world was gradually realised by policy-makers (Margetts 2006).

According to Weber (1947), the most rational, most efficient, most stable, and most reliable form of administrative organisation is the most purely *bureaucratic*. This, as an "*ideal type*", is a form of authority exercised through legal-rational institutions, in which office-holders at all levels act according to carefully-designed, abstract, impersonal rules. Those whom Margetts (2003) has called "*Hyper-modernists*" celebrate the possibilities offered by technology for systematising these rules and for increased rationality through ever more effective data collection and information processing.

Such a view relies fundamentally on a "Cartesian" (Ehn 1988; Spaul 1997) conception of information as a representation of cold, hard entities in the external world: which vehicles have driven beyond a certain point, and when? Has the required charge been paid on time? Has the correct fare been paid for this journey? What train services stop at a particular station? ... Following this conception, information *systems* are the electronic manipulation of symbolic representations in ways which mirror the inner workings of the organisation or the requirements of government.

When e-government is encountered in practice by citizen/consumers in the course of their daily routine, the disembodied representations of rational policy come into harsh contact with the contingent, unpredictable, complexities of lived life. People understand or interpret situations immediately or through conversation with others; they make meanings of situations in ways which are both extrinsic and intrinsic, felt physically and emotionally. This realisation is an important qualification of the Cartesian view of information systems, and therefore holds important lessons for the support of public policy and the transformation of government through technology.

1.1.2 Motivation for this thesis: living with e-government

How we think about technology and what it can do for us defines how we will use it, design with it, and experience it. The opening words of this thesis refer to "*the use*" of information systems; however, it is not only government which is making use of these systems, but the citizen/consumer encountering them in daily life. How designers and implementers of public policy think about the representation of policy in information systems defines how it is experienced by those who use those systems.

One obvious difference between e-government and many of the systems which form the basis for other research into the relations between society and technology is that, in the case of e-government, users are not in the workplace; this is true for many other interactions with computers, but e-government has the property that although not in the workplace, the transactions may be an obligation for the user, whether made electronically or through traditional channels.

The motivation behind this thesis, then, is the need to re-focus e-government research onto those who live with this technology but do not live *for* it, and onto their contingent, situated experiences, building on an emergent strand in research into the interactions between people and computers, and showing the implications which this has for public policy.

1.2 The research questions

There are, then, two sides to the issues which this thesis addresses. For e-government users, there is the experience of e-government, arising not only from *implementation* but more fundamentally from the *design* of public policy; for policy-makers, the question concerns the achievement of policy objectives with e-government, to which experiences with the systems in actual lived life are an important contributor.

As a focus for the research, this is framed by the following two questions:

1. In what ways do policy decisions, as part of the design of policy manifested in the developed systems and experienced by users, lead to positive and negative experiences in the lives of users of the systems?

2. Conversely, in what ways do positive and negative perceptions in the lived experiences of users of the system contribute to, or detract from, public policy objectives?

The basic claim, which the research deepens and substantiates, is that usability is an issue for public policy: policy design has usability implications, and conversely usability problems can contribute towards a negative reception of public policy by citizens while good usability contributes to citizen satisfaction.

This can be represented diagrammatically as an outline; the task for this thesis could be said, in summary terms, as being to fill in the outline:

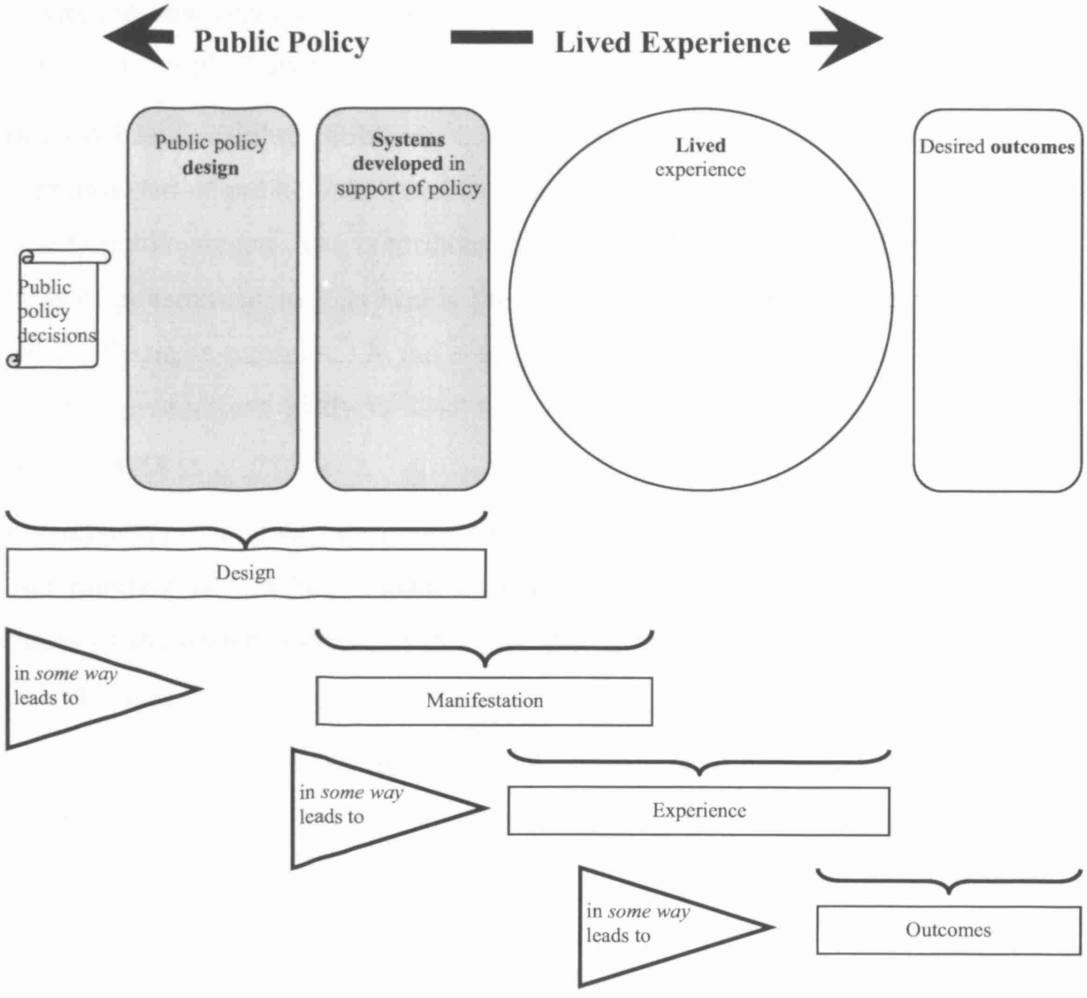


Figure 1: Outline of public policy, implementation, lived experience, and policy outcomes

Thus, design of public policy is said to manifest *in some way* in systems and these are said to kead to *lived experiences* for service users, which in turn contribute *in some ways* positively or negatively to desired public policy outcomes. However,

design, manifesting in systems, lived experience, and outcomes in public policy, and, above all, the *ways* in which these are inter-related, all remain to be defined.

1.2.1 Usability in support of policy aims

In terms of basic effectiveness, a number of high-profile incidents have highlighted the *political* impact of a failure to consider usability sufficiently thoroughly. In this sense, "*designing user interfaces to technology is a political act*" (Lazar, Johnson, & Hochheiser 2005:13); it influences and constrains what people can and cannot do.

So a view of e-government as the raw availability of online government services, or even as transforming the internal working of government and providing new services in new ways, is insufficient since it ignores the usability and usefulness of services in peoples' lives.

Beyond basic usability problems, user experience is important for e-government, both as a part of public value, and to promote acceptance of public policies. High-quality public services can contribute to desired policy outcomes (Kearns 2004) in areas of government such as health, the environment, or, the central area of interest for this thesis, in transport. On the other hand, constraints perceived as unreasonable by service users are likely to lead to resentment and antagonism on the part of service users.

Conversely, public policy decisions have usability implications; what happens at the user interface is to a large extent a manifestation of policy decisions made at all stages of the design process; even at the policy design stages, usability must be a consideration.

Policy decisions have implications for the usability of technology because they rely on technology for much of their implementation, and are constrained and enabled by the capabilities of the technology. The impact of policy decisions continues throughout the life-cycle of a system and beyond: system design is a continual *process*, rather then a discrete activity which is complete once the system is "*delivered*" (Bannon & Bødker 1991; Markus 1984).

At the same time, policy-makers cannot, and certainly *should* not, control all aspects of the interaction. Usability is a policy issue in this sense, then, that it is as much a question for the ways policy-makers seek to *aim towards* policy objectives without

being able to be certain of the outcomes, as it is of system designers implementing interactions as stages in well-defined tasks carried out by end users.

1.2.2 Experiences with technology

The motivation of this thesis and the research questions suggest that interactions between humans and technology should be considered not only in terms of basic usability but of *experience*.

User experience has an obvious importance and has been influential in the design of games, art installations, and other leisure applications (Wright & McCarthy 2005). But, as the vignette above suggests, routine encounters where the interaction is peripheral to the user's own desires are also part of the user's experiences, and perhaps enter their awareness in ways which add to or diminish their experience with the system as a whole.

This vignette (taken from a narrative by the shop-keeper) is more than simply an illustration that computer systems, as physical artefacts, are prone to failure.

The would-be charge-payer was interrupted in his daily routine, and so was presented with a problem requiring a practical solution. A solution to the problem required the driver to draw on a complex set of half-known knowledge and internal deliberation, and no doubt also an urgent deliberation with the shop-keeper. Furthermore, both the payer and the shop-keeper understood the need and the solution to the problem immediately, in the kind of unremarked intellectual achievement which is easily dismissed as simple "common sense".

The experience of the man running to the shop was physical, being breathless, perhaps being cold and wet, certainly being inconvenienced; it is emotional, in the anxiety to pay on time and the relief when payment is accepted; and the experience is situated, and only makes sense, at a particular time and a particular place.

Usability in this sense involves more than what happens at the interface; the interface itself is only one boundary between system and user, and as such, is negotiable and contingent. It seems obvious that the focus should be on the users' perspective rather than of that of the computer, but as computers are increasingly encountered in passing as part of routine daily activity, it is less the case that people are consumers of an interactive product and more that these passing encounters impact many aspects of people's lives.

1.3 Research contributions

The contributions of this thesis can be summarised as:

1. to look critically at the experiences of users of e-government systems, and
2. to relate these experiences to public policy

within the context of a single area of policy, in one urban area, and at a certain time.

In this sense it is not *design* but *analysis and critique*. The paradigm is not hypothesis-testing, but investigation and explanation. The findings of this thesis will hold lessons for several groups of stakeholders in urban transport: for policy-makers, for implementers, for staff and managers, and for the travelling public.

1.3.1 Theoretical contributions: Bringing together emerging strands of thought

This thesis considers the inter-relationships between policy and usability building on an understanding of the interactions between humans and computers not only at the interface but also in the wider lived experience.

The aim of this thesis is to *raise* the need for the first of the research questions presented in section 1.2 to be understood in the light of the second, and begins to build such an understanding, on the basis of empirical research and careful, reflective analysis.

There is an emerging realisation in Human-Computer Interaction (HCI) research of the need to look beyond the interface to the wider experiences of system users. On this basis, it makes little sense to consider usability or user experience as separate; here, "usability" *is* the user experience.

But the term "user experience" does not really capture the fullness of lived experience; it is accurate only in the sense that the user is a living human being with desires and aims beyond the interaction. The theoretical implications of the development of the study of HCI, from considering users as "human factors" to a fully-rounded understanding, are developed in **chapter 2**.

This thesis brings this HCI movement together with the public policy research tradition in e-government to throw light on the interplay between the two. In **chapter 3**, a range of viewpoints on information technology in the public policy

tradition is joined with wider theories about the ways in which government seeks to achieve policy aims, and this leads to a deeper understanding of this interplay.

1.3.2 Methodological contributions: Situating the research in the HCI and Information Systems traditions

The essential contribution of Human-Computer Interaction is to assert that usability is, or should be, a fundamental aspect of system design. "Human factors" are not an additional limitation on design, and the user interface is not marginal but *central* to the functionality of the system (Grudin 1990; Grudin 1993). This assertion leads to the claim made by HCI to represent the user, in the sense of *advocating for* the user (Cooper & Bowers 1995).

Information systems have been widely studied as social systems in the *workplace.* Some of this research has had an explicit aim of producing emancipatory systems, that is, of emancipating the *workers* as users of the systems.

However, e-government services are not usually in the workplace, and in the case of transport are often encountered fleetingly, in transit. Users of these services, then, are in some senses similar to "customers", yet are also "citizens"; and they are heterogeneous, widely varying in their skills and knowledge.

These considerations pose new problems in understanding their usability needs. The approach to overcoming these research challenges and relating lived experiences of service users to public policy is outlined in section 1.4.2 below, and developed in detail in **chapter 4.**

1.3.3 Empirical research

The thesis makes its contributions on the basis of three case studies in one area of public policy: urban transport; these are presented in **chapters 5**, **6** and **7**. By focussing on one policy area, different viewpoints can be taken into account while, to borrow terminology from a more positivist tradition, other independent variables are fixed to some extent.

The three cases are:

- The **Oyster transport smartcard**, introduced by Transport for London in stages starting in the autumn of 2003;

- The **Central London Congestion Charge**, a flat-rate road charging system operating during weekdays over a single zone in Central London;
- The **Transport for London Journey Planner**, a real-time journey planner for all transport modes in the GLA area.

Urban transport is an especially suitable, yet under-researched, area of e-government as public policy. Transport in London is a public service, provided in support of specific policy aims: an integrated transport system, economic efficiency, safety, a focus on the needs of the transport user (GLA 2001a), and the encouragement of the use of sustainable modes of transport.

1.3.4 Outcomes: Lessons for stakeholders and well-founded hypotheses

The outcomes of the research are distilled from commonalities across the case studies into suggestions which are of interest to various groups of stakeholders in **chapter 8.**

In **chapter 9**, the theory is refined, on the basis of the findings, into well-founded hypotheses, which are strongly supported by the evidence presented here but do not necessarily claim generality on the basis of case studies in one area of application.

The choice of transport as a research area at a time of rapid policy, technical, and organisational change in a single urban area, London, provides an additional perspective on policy development and integration.

This research area is of urgent importance: London's transport "*crisis*" is not only a cost to business and a threat to competitiveness (GLA 2001f), but, of special relevance to the themes of this thesis, worsens the quality of life of visitors and residents of London. The specific contributions of e-government to overcoming the crisis are discussed in the reports of each of the case studies, but, just as the overall transport strategy relies on integration across several policy interventions, so the cases studied here work together in support of the wider aims.

1.4 Outline of research approach

Any understanding of e-government is necessarily multidisciplinary. In particular, as the first section of this introduction has implied, this thesis aims to join together

insights from research into the interactions between humans and machines with some key strands of public policy thinking.

The interest is in understanding how people live with technology. And this understanding starts from the view that in any interaction, there are at least three components: a living human being acting in inter-action; the technology, itself a complex interweaving of systems; and the inter-relations between them.

1.4.1 An interpretative approach based on empirical data

The commitment to focusing on the experiences of users of services implies a reliance on *empirical evidence* directly from those users. The primary sources of this evidence are narratives and observations. Since the interest is in the *encounter* between users and systems, understanding the systems themselves is the other essential viewpoint, so documentation and in particular policy documents are a second vital source of data.

These two streams of discourse demand an *interpretive* approach. But an early finding was that people are enabled and constrained in action not only by the immediate interface but by the ways these work together, as an ecology of affordances. This suggests that it is necessary to take seriously the artefacts of systems as well as the discourses surrounding them, to interpret the interplay of the social with the technical.

To focus on experience is to question the enlightenment tradition of the supremacy of thought in a way which is, at root, phenomenological. This is reflected in the approach of this thesis through the use of Discourse Analysis and Grounded Theory, and in ethnomethodological investigations into the ways in which service users *make sense of* their experiences.

1.4.2 Making sense of experience

So this is not an investigation of experiences of users alone, but of users in interaction with technology; these are dialogical encounters between self and other. One aspect of this encounter is in the potential for new forms of openness which e-government offers, but there are opposing tendencies towards greater inflexibility and the reduction of social life to what can be formally encoded (Ehn 1988).

This thesis draws together four theoretical strands in order to understand these tensions and the ways they are experienced by service users:

1. The *ecological* strand takes seriously the artefacts in which systems are embodied, seeing systems in terms of their *affordances* as resources for action, as people perceive systems encountered in mundane life;
2. the *phenomenological* strand analyses narratives to understand the essence of lived experiences with technology; this leads to analytic traditions descended from phenomenology: ethnomethodology, Discourse Analysis, and Grounded Theory;
3. the *dialogical* strand is inspired by the ideas of MM Bakhtin to explore the richness of *encounters* between "self" and "other"; in these encounters the "I" is committed, everyday events are emotional and volitional, both self and other are changed in an unfinalisable process;
4. the *pragmatic* strand understands the importance of engaged activity in experience, rejecting a duality of ends and means. This is the philosophical pragmatism of Mead and especially Dewey. It is this, rather than Cartesian logical positivism, that Coyne proposes as "*the operative philosophy of the computer world*" (1995:x).

1.4.3 Focussed case studies

The case-study approach adopted in this thesis maintains the multidisciplinarity which is fundamental to the research, while concentrating on one application area. The variety of e-government interventions implicated in these three cases provides multiple perspectives; the integrated policy which is at the centre of the research provides unity to the thesis and to the findings.

The use of case-studies of services in which users interact with government is not a lapse into a service-provision viewpoint of e-government; the hidden ideologies and limitations of such a viewpoint have been well critiqued by Zouridis and Thaens (2003) and by Grönlund (2003), among others.

This thesis, however, provides a different critique by focussing on a sample of those very services. "*Policy comes alive in the daily practice of street-level bureaucracy*", as Bovens and Zouridis' (2002:175) put it. Their insights into the transformation of low-level decision making into administrative-technical processes are made from detailed analyses of particular public-service work.

Similarly, this thesis is concerned to look closely at the details of services, but not from the point of view of service providers, but from that of citizens and others as they make use of these services.

1.4.4 Research scope: addressing the transport crisis in London

The single authority, Transport for London, set up in 2000 as part of the newly established Greater London Authority, has a remit covering all transport modes (currently with the significant exception of overground trains). This recent devolution to a new, unified, policy and delivery public body provides a fortuitous opportunity to give a coherent focus to the research as a whole.

Transport for London provides a boundary and defines the scope of the research. In keeping with the aim of re-focussing research onto users of e-government services, information technology and organisation internal to TfL is outside the scope of this thesis. This coincides with TfL's own understanding of e-government: the cases studied here cover their three key e-government service initiatives for electronic ticketing, traffic management, and travel information (TfL 2004j). The Countdown real-time bus information is not included because it is known to have problems of accuracy and timeliness and is being replaced. The other major area of e-government considered by the TfL e-government strategy is on-line consultation; although an important area of e-democracy and e-governance, this does not fall into the specific interest in service delivery.

TfL itself carries out usability and accessibility testing (TfL 2004j) and extensive qualitative and quantitative research into customer satisfaction and future needs (TfL 2004c; TfL 2005g). But the aims of this thesis are rather different: to provide an integrated analysis, and to build on existing research in this and other areas of public policy as the foundation for insights which provide lessons for different stakeholders, and as a contribution to e-government research more widely.

1.5 Overview of the thesis

The remainder of this thesis is in three parts:

I. Developing the idea of the lived experience with e-government

Chapter2: From human factors to lived experience

This chapter reviews the history of the idea of the user and of usability and of the changes in computing technology and the contexts in which it is encountered. This leads to the development of a framework for understanding the inter-relations between humans and computers. This framework conjoins a non-essentialist understanding of technology with Dewey's pragmatism and, following the ideas of Bakhtin, emphasises the emotional-volitional *oughtness* of *being* in living with technology.

Chapter 3: e-Government: information systems in support of public policy

The achievement of policy objectives in e-government is discussed in this chapter, in particular through public services. The chapter reviews the major debates in e-government around transformational government, citizens and consumers, equitable access and take-up, and e-democracy. This is then joined with the concepts of lived experience developed in the previous chapter to form a theoretical basis for the importance of usability in e-government.

Chapter 4: Methodology

Chapter 4 unpacks the research questions and provides the methodology for addressing them, on the basis of commitments to an interpretive approach, to taking seriously the physicality of technology without recourse to essentialism, and to the wholeness of lived experience. The methodology is essentially phenomenological in that it accepts the reality and messiness of ordinary life. Avoiding out-of-context experiments, interviews and focus groups are analysed in the light of policy documents, situated observations, and interviews with key staff to form true case-studies.

II. Empirical exploration of the lived experience: Three e-government systems in urban transport

Chapter 5: Case study 1: The TfL Oyster smart card

Chapter 6: Case study 2: The Central London Congestion Charge

Chapter 7: Case study 3: The TfL Journey Planner

These three case studies provide contrasting viewpoints of the encounters with artefacts, of the public policy aims, and of the way users relate with the service. Some of the applications are new and rely on information systems for scale or reach;

others are enhancements to established services where the implications of technology are thrown into sharp relief.

Each of the studies analyses the affordances and genres of the systems and the ways in which they fit with daily life, based on an analysis of interviews with transport users. These narratives are then the basis for understanding their lived experiences. Drawing on documents and élite interviews, the studies conclude by relating users' experiences to the policies from which they arise and which are enabled by them.

III. Drawing out commonalities and lessons for stakeholders

Chapter 8: Lived experience and public policy revisited

Chapter 9: Conclusions

The final two chapters draw together the common themes from the findings of the case studies. The ways in which people deal with the complexities of daily encounters with the transport system are considered as forms of meaning-making and *bricolage*. The lived experience in each of the cases and the significance of this for public policy is revisited to draw commonalities across the studies. Concluding, these lead to lessons for groups of stakeholders and some emerging hypotheses concerning e-government more widely.

1.6 Conventions

1.6.1 Notation for quoted text samples

The interviews and focus groups were transcribed in full from audio recordings using a reduced version of Jefferson's conventions (see (Antaki 2003) for a good summary). In particular

- the symbol // is used to show two people talking together
- brackets indicate utterances which cannot be written phonetically, for example, (laugh)
- two dots .. show a pause in the speech ..
- three dots ... show omitted parts of the text

In the focus groups, participants are referred to a P1, P2. The interviewer is identified by lines with the prefix I:. For ease of reading, some details are omitted from presentations of text samples.

Text samples presented in the main body of this thesis are identified by the interview (II = Individual Interview, FG = Focus group, or a relevant sample from a different case study, such as JP = Journey Planner) and line number in the transcript.

1.6.2 Style conventions

Exact quotations from cited work are italicised and enclosed within quotation marks. Where a quotation includes italics in the original, this is shown by underlining:

... it is possible to "*design for an experience*" (Wright, McCarthy, & Meekison 2003:52)

Italics are used elsewhere without quotation marks for emphasis, or for non-English words.

Quotation marks without italics indicate an expression in common use:

... the concern in HCI for "interaction design" ...

Underlining is also used to show literature titles.

1.6.3 Definitions

The terms **usability**, **user experience**, and **lived experience** are used extensively throughout the thesis in ways which are explained briefly above and more extensively in the following chapter. **e-Government** is understood to refer specifically to the use of electronic information technology that is not only internal to government; that is, between government organisations, between government and businesses, and especially between government and the public.

The term **socio-technical systems** (STS) is used to refer to the tradition descending from the early work of the Tavistock Institute. This thesis clearly does take a view which is both social and technical, but other words are used to describe these inter-relations where the context is not specific to this tradition.

The term **information technology** is used rather than **Information and Communication Technology (ICT)**. Communication is now so interwoven with other aspects of these technologies that it no longer seems appropriate to identify it separately. **Information Systems** is used with capital letters to refer to the research tradition; **information systems,** un-capitalised, refers to the social and technical systems of which Information Technology is a part. Similarly **Discourse Analysis** is

used to refer to methods and theories concerning the analysis of discourse, whereas **discourse analysis** refers to a specific analysis undertaken as part of the research.

Other definitions are given in the **Glossary**

Photographs and other figures are the author's own, except where otherwise attributed.

PART I: THE LIVED EXPERIENCE WITH E-GOVERNMENT

Summary of literature review

This chapter and the following chapter, while developing the arguments of this thesis, review the literature on usability, lived experience in relations between humans and machines, e-government and public policy, across streams in Information Systems, HCI, and Public Policy research, summarised in the following table:

Stream	**Interests**	**Contributions**	**Mainly in section**
Information Systems			
Relations between social and technical	Social change and technological change: mutual shaping of technology and society	Socio-technical systems Technology and power	3.4, 3.4.1
	Dis-intermediation	Empowering the citizen; new service model; myth of dis-intermediation	3.2.2
	Modes of information "implicit" in technology	"Infocracy" Closure of contingent action at "street-level"	3.2.4

Stream	Interests	Contributions	Mainly in section
	Anti-essentialism	Avoidance of essentialist assumptions; affordances and social-technical objects	2.2.4
	Socio-technical systems	Technology as politics; improving working conditions; emotional and social impacts of technology	2.3.1, 3.4.1
	e-government transformation	Transformation through information technology, and critiques	3.2.1
Internet studies, e-democracy, e-government	Democratic impacts	Fears of surveillance; fears of control; loss of democracy; strong vs. weak democracy	2.3.1, 3.4.1
	Transformed government	BPR; post-bureaucratic administration; re-inventing government	3.2.1
	e-government vs. e-commerce	Critique of e-commerce model; citizens as customers, clients, and consumers	3.2.6, 3.4.4, 3.2.3
	Equitable access	Access to e-democracy; cultural and literacy factors	3.4.5, 3.4.6

Stream	Interests	Contributions	Mainly in section
Human-machine interaction			
Traditional HCI	Early models of cognition	Humans as processors, computers as ideal brains	2.1.2
	Task-oriented	Supporting tasks; simple interaction	2.1
Historical development of concepts of user and usability	Constructing the user	Users as problematic; "human factors"	2.1.1
	From factors to actors	User in social context; Affective computing; Computers engendering and responding to emotion; users as skilled actors	2.1.4
	The usability movement	Heuristics and rules-of-thumb; practical methods to improve usability	2.1.5
	Defining usability	Usability standards; understanding context; measuring satisfaction	2.1.6
Encountering computers	The changing computer	Computers outside the workplace; ubiquitous computers	2.2.8
	Everyday encounters	Computers are peripheral to action; pervasiveness of computers	2.2.1, 2.2.8

Stream	Interests	Contributions	Mainly in section
	Computers as resources	Distributed Cognition; artefacts as resources; plans as resources for action	2.2.7, 2.3.6
	Affordances	Affordances for action; for defamiliarisation; for understanding Ecologies of affordances Borders and border features	2.2.3, 2.2.4, 2.2.5
	Collaborative practice	Communities of practice; Distributed Cognition, communicative practices	2.1.3, 2.2.7
Seminal critiques	Human actors	Users as socially situated, skilled actors	2.1.4
	The Turn to Practice	Critiques of planning model; situated action; overcoming problems in contingent life	2.3.2, 2.3.6
	Phenomenology, unconcealment	Challenging rationalism; transparency of action; Becoming-ness	2.3.3, 2.3.4
	Bricolage	Concreteness and appropriation; using computers in practice	2.3.5
Emerging strands in HCI	Emerging issues in the technology	Ubiquitous computing, the invisible computer	2.2, 2.2.8

Stream	Interests	Contributions	Mainly in section
	Lived experience	Bodily encounters; *Befindlichkeit*; feelings	2.4.1, 2.4.2
	Perspectives on experience	Flow; threads of experience; feltness is integral to experience; pragmatism and dialogism	2.4.2, 2.4.3
	Dialogicality in context of computer use	Human-machine interactions as dialogue; reader as writer; oughtness in everyday encounters	2.4.4
	Usability in e-government	Basic usability in e-government Interface design as a political act; Policy and the lived experience	3.5.2
Public Policy			
Academic discipline of Public Policy	How government addresses social problems	Support of policy aims; citizen behaviour change, information provision	3.1.1
	Tools of government	Informatising the tools of government; cultural change	3.1.2
	Encouraging sustainable transport use	Problems of transport; encouraging behaviour change in transport	3.1.3

Stream	Interests	Contributions	Mainly in section
	New forms of government	NPM or "digital state"; post-bureaucracy	3.2.1
	Service provision	Encouraging change through service provision; public value; importance of usable services	3.2.5, 3.2.6
	Weberian ideal type	"street-level" servants and administrative processes; strategic evasion	3.2.4
	Service delivery and satisfaction	Dangers of service-delivery approach; integration of service and public value	3.2.6
	Institutionalism	Continuing inertia of institutions; technical or social determinism	3.4.2
	Changing relations between government and citizens	Autonomous problem-solving; delegation of responsibility Marketisation and equality of access; joined-up government; Portals	3.4.5, 3.4.5, 3.2.3
Government and Commercial research and policy	Citizens as customers	"let us know what is good for you"; international comparisons of e-government	3.4.4

Stream	Interests	Contributions	Mainly in section
	Equitable access	Consideration of multi-channel access	3.4.5
	TfL's transport policies	Objectives of transport policy; Economic importance of transport	3.1.4
	Discourses of e-government	Technological determinism of e-government policy	3.4.3, 3.2.3

Table 1: Summary of literature review

Chapter 2

From human factors to lived experience

This chapter reviews the literature and develops an inclusive understanding of usability in the lived experience. The next chapter contains a review of the literature on e-government and in particular on the inter-relationships between usability and e-government, and develops an understanding of the importance of usability for the achievement of policy objectives.

In the following sections, the history of the concept of the "user" and of usability, the focus of interest in Human-Computer Interaction, is critically examined, and apparently simple objects such as "the computer" and "the interface" are found to be complex, permeable and mutable.

In the light of increasing ubiquity of computer systems, it is less and less possible to consider usability without also looking at the contexts within which interactions are embedded. Conversely, users' experiences of, and interactions with, technology are fundamental to the relations between technology and social systems; it is necessary to take seriously the materiality and functionality of technological artefacts as well as the situations in which they are encountered. Experience involves values, feelings, and a sense of agency, as well as being physical and situated, and in this sense is not *mere* experience but *lived experience.*

2.1 Usability: the genealogy of a concept

In a standard textbook on HCI, the ways in which people interact with computers – the area of interest which defines HCI research – are said to concern three things: *people*, *computers*, and the *tasks* that people wish to carry out. The ability of the system to support the users' tasks provides a fourth focus: usability (Dix, Abowd, Finlay, & Faulkner 2003). So usability is not all there is to HCI, but applying HCI in practice leads to usability as a central concern. However, it is important to clarify what exactly is meant by "usability". This chapter challenges a concept of usability which is limited to the person/computer interface in the performance of defined tasks. It is satisfactory as far as it goes, but fails to treat the person in the richness of human life, as computers, and technology more widely, are now such an integral and ubiquitous part of everyday experience.

Usability is not simply a function of the interface, but is better seen as interaction, that is, as human action. Even in these basic texts it is understood that usability extends beyond the interface, but to continue the investigation it is necessary to survey the history of the concepts of usability and the person experiencing it, that is, the "user".

2.1.1 Constructing the user

For the earliest computers, the "user" was scarcely a consideration: the users were the same electronic engineers and mathematicians who had designed and built the machine. To the extent that "the users" were considered at all, it was in terms of the *limitations* that they imposed upon the perfect operation of the technology, for those parts of processes that could not be so easily automated (Kuutti 2001). These "human factors" were mostly of concern for what they are *not*: they do not have perfect memory, they have a limited attention span, etc. and these failings needed to be factored into the overall design (Bannon 1991).

According to Lamb and Kling (2003), the user concept in information systems is based in the cybernetic models of Simon (1955), which see the user as an atomic individual with well-articulated and entirely rational requirements, within certain cognitive limits. According to this view, information from objects, the environment, and interactions with other atomic individuals is cognitively processed as feedback to fine-tune the preferences that influence choice; wider context is not important. Yet, users are often "*configured*" (Woolgar 1991) in ways which attempt, at least, to meet their contingent needs, often using imagined constructions of real users.

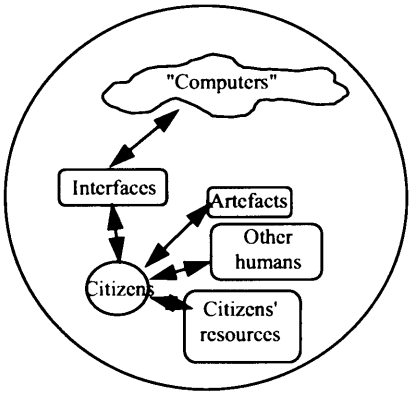
2.1.2 The human information processor

A simplistic understanding of the user leads to a further danger. If computer systems - not just the hardware, but the "*living machine*" (Poster 1990:148) - are understood to be engaged in the manipulation of closed and unambiguous symbols, then the computer may be taken as the criterion by which to study intelligence (Poster 1990). Poster is justified in his analysis: the underlying metaphor of early cognitive psychology is "*the human as an information processor*" (Blythe & Wright 2003:xvii); this is the explicit model of early applications of psychology to HCI such as Card Moran Newell's (1983) "*Model Human Processor*", even though they are careful to point out that this is a deliberate simplification. A converse view,

while still conflating humans with machines, conceives of computers as ideal forms of the human brain, which are supposed to know better than a human "*what is really happening*" (Zuboff 1988:247).

2.1.3 The socially situated user

More recent research has realised that the user does not exist alone, but can draw on their own experience and training, and works surrounded by other artefacts, and by other people; this realisation has grown in parallel with changing technology supporting group work. Interactions with computers incorporate the wider social environment, including other humans (as part of a working group and as support staff who help "interface" with the computer), as well as other artefacts, documentation, training, and the organisation itself (Grudin 1990; Grudin 1993). Figure 2 below is an extension of a diagram by Grudin (1993) showing the user/citizen in context, but extending this to context inter-relations with public policy.



The "Computer" is now an amorphous and pervasive network, interfaces are varied and ubiquitous, and other humans are heterogeneous, perhaps in a "community of practice". The whole forms an ecology of objects, systems, and people

Figure 2: Update of Grudin's (1993) conceptualization of a user's interface to a computer

Even when working individually, users *peripherally monitor* and co-ordinate their work, perhaps in ways which are not immediately apparent. This might involve the use of non-electronic artefacts in conjunction with computers (Dourish 1995), for example, paper flight strips used by air traffic controllers (Mackay 1999) or paper timetables (Heath & Luff 1992).

Collaboration is an important part of work *in practice*, in contrast to abstract, Tayloristic, accounts of work (Brown & Duguid 1991). Orr (1996) showed the importance of *narrative* as workers share skills and practical solutions to problems with one another. Both in the workplace and elsewhere, these social networks

develop effective, but often invisible, "*communities-of-practice*" (Brown & Duguid 1991; Lave & Wenger 1991), not only to overcome problems but also as a form of informal or more structured learning. Lave and Wenger (1991) develop this view of learning into a notion of *legitimate peripheral participation*; learning is a process of moving from observing from the periphery towards becoming an insider in a community.

2.1.4 Users as human actors

Users are themselves experts in their own fields, as Grudin (1993) notes. Users bring to their interactions with computers their *own* skills; as Bannon (1991) says, it is the system designers who are (sometimes) naïve about this work, for which computer use is merely incidental.

For the programmer, immersed in the depths of the logic of a software system, and for the co-ordinators of large programming projects, it can be hard to conceive of a user who lives in a different world from themselves (Agre 1995), but the user is also *situated* within their own world - socially within their workgroup, with clients and colleagues, and physically within an environment.

The "user", then, is not simply a "factor", but a human being, with skills, abilities, and values; a human actor (Bannon 1991). Interactions are *emotional*; designers (of any artefacts, as well as of technology) are increasingly aware of this emotive quality of interaction with objects (Norman 2004).

Some researchers address emotion in interaction through *affective* computing (Hudlicka 2003; Lisetti & Nasoz 2004) or *value-sensitive design* (Friedman, Kahn, & Borning 2004). Although to ascribe emotions and feelings to a person is essentially to differentiate them from a machine, in many ways attempts to understand *affect* rely on a model of the "user" which is not so different from the rationalist model: it reduces emotions and feelings to information which can be detected and measured, and ignores the ambiguities and complexities of emotion.

Affective computing has aimed to design computers to be sensitive to emotion, or, in a more interactional approach, to subtly reflect emotions. The point here, though, is that all interactions are emotional "*at the interface of experience in the world*" (Boehner, De Paula, Dourish, & Sengers 2005:67), whether or not the systems are explicitly designed to respond to emotion.

2.1.5 The usability movement

Underlying the concern to understand "the user" is the need for systems to be use-*able*, an increasing necessity as users became more heterogeneous. It will be argued below that common definitions of usability are too narrow; nevertheless an awareness of the centrality of usability reflects an important re-focussing of computer systems from the concerns of implementers towards the needs of users.

It was increasingly realised that usability is of important practical concern, leading systems designers and developers to the *usability movement*. Not particularly concerned with theorising the nature of the user, the usability movement is practical in its interests (Kuutti 2001).

Practical techniques to try to ensure the usability of systems include Nielsen's "heuristics" - which are not heuristics in the true sense of helping to generate theory, but "*rules of thumb*" (Nielsen 1994; Nielsen 2005). The relative ease with which these concepts can be understood and used has contributed to their enormous significance and popularity, but they have subtleties which may be missed. For example, Nielsen's heuristic "*match between the system and the real world*" can be understood either to mean simply "*speak the users' language*" on a web page, or, more broadly, could be used to throw light on issues as users interact with technology in their practical daily lives.

However, this practical approach, although widely applicable, remains technocentric in its concept of usability. A more developed understanding of what is meant by usability is needed. The following sub-section looks at one well-known definition of usability; later sections critique and develop this conception.

2.1.6 Defining usability

The most widely accepted definition of usability is the ISO 9241 Part 11 standard (1998; Travis 2005), with its three dimensions of effectiveness, efficiency, and satisfaction. It is encouraging that usability is recognised as sufficiently important to warrant an ISO standard, and, as Dillon (2001) says, this is an extremely useful definition especially for its emphasis on *context* and on the *type* of user and the type of task. ISO 9241-11 is clear that usability depends on the context of use, which includes the users in their specific circumstances.

However, reflecting its age, the standard is limited in its scope; usability is considered as a subset of ergonomics for office work with display terminals, although the document actually discusses usability beyond this narrow specification.

The definition of usability as detailed in ISO 9241-11 is too restrictive not only in terms of its outdated hardware context, but more fundamentally in its reliance on measurable values, which leads to a narrow conception in terms such as speed and accuracy (Dillon 2001). One particular shortcoming is its rather superficial concept of satisfaction as a "*positive attitude towards the product*"; satisfaction could be fulfilled if people's expectations about the outcome of using a particular product are confirmed, but this does not necessarily lead to pleasure (Hassenzahl 2003).

This definition, then, fails to take account of the whole person, or does so only in terms of the human as sophisticated machine with measurable attributes. This realization is only partly addressed by a change of language from *usability* to *user experience*, part of a set of developments which are considered later in section 2.4. But first it is necessary to look at the other side of interactions, at computers themselves.

2.2 The changing computer

The changing nature of the computers themselves is a further challenge to early ideas of human interactions with computers. The category of "the computer" is "*multiplying and dissolving*" (Agre 1995:69) and is certainly not necessarily in the workplace; now computers are to be found in many domestic appliances (Bertelsen, Eskildsen, & Sperschneider 2003), as well as in many mobile and other personal devices.

2.2.1 The computer in context

Much research into the increasing ubiquity and invisibility of computers focuses on technology. Examples are research into interactive workspaces and smart environments (Russell, Streitz, & Winograd 2005; Streitz, Magerkurth, Prante, & Röcker 2005). However, for the user, as the computer becomes more and more invisible, so their interaction with it becomes ever more *transient* (part of their real business, not their business in itself) and contingent; "*in fact, users don't think of themselves as primarily having anything to do with the computer at all*" (Lamb and Kling 2003).

It is notable that the term "user interface" is technology-centred: it generally refers to "*a computer's interface*" to a user rather than "*a user's interface*" to a computer (Grudin 1990; Grudin 1993). The point is that the interface includes, and extends to, the social situation of use.

This has enormous implications for HCI; it is no longer sufficient to focus on interactions separated from their context. There is risk, though, that this recognition can lead to the point that "*HCI is effectively a boundless domain*" (Barnard, May, Duke, & Duce 2000), and, in consequence, that local theories are used as tools by practitioners, separated from the deep theory which could bind the practice; heuristic or "rule of thumb" approaches are arguably an example of such a development.

2.2.2 Interfaces as borders

This critical examination of the notion of the "computer" starts by looking at the interweaving of physical interfaces with their social and cultural contexts. A useful metaphor is to consider them as *borders*. As elaborated in a seminal article by Brown and Duguid (1994), borders mediate between the centre and periphery in setting the *context*, for example in the ways that architectural details give signals to the various parts of a building.

By focusing on the relation between the centre and the periphery of designed objects, Brown and Duguid aim to place objects in their context. The borders of artefacts are, then, to an extent "*indeterminate and practical*" (Brown & Duguid 1994), since details features of interfaces which may be peripheral in some contexts are central in others. Like the borders of a nation, it is a physical manifestation of complex social processes and negotiations.

The border itself is separable from the periphery, and as such often has useful properties for interaction; unconsidered features of borders, such as beeps and rattles, overheard snatches of phone conversation, or notes on a paper timetable, also have implications for collaborative activity (Heath & Luff 1992; Mackay 1999).

2.2.3 Features of the interface as affordances

In the case studies which follow, border features of artefacts are analysed in terms of the *affordances* which they offer to the traveller. Affordances provide a way of

looking at the *usefulness* as well as the usability of artefacts; that is, the actions which an object *affords* (McGrenere & Ho 2000).

The concept of affordance was originated and developed by Gibson (1977): features of an environment which afford particular sorts of action to individuals. For example, extended horizontal spaces afford support for animals that would otherwise sink into a swamp; water affords drinking, but, for humans it does not afford breathing.

Affordances point both to the environment *and* the observer; affordances are *relative to the animal* (Gibson 1979). A sufficiently horizontal, flat, and extended surface *affords support* only if it is also sufficiently rigid, *relative to the weight of the animal*. Later, this deceptively simply notion will be applied to each an analysis of the ecology of affordances in each of the case studies. It will be see that there are properties of the system which *could* provide affordances *if* they have some requisite properties *relative to the system user*.

However, although it may be necessary for affordances to be learnt, as when a child learns about herself and about affordances for herself and for other observers, this is not to say that "meaning" is added to an object in any intellectual way. All animals have affordances and all are able to *perceive* affordances.

Affordances are for *action*; but for Gaver (1991) it is the *perception* of an affordance which links to action, and so hidden affordances lead to mistakes on the part of users. It is this *perceptibility* of affordances which has been popularised in HCI and interaction design by Norman (1988), with formulations such as Norman's "*plates are for pushing, knobs are for turning*" (1988:9).

However, with widespread use of these design ideas, some of this subtlety has been lost (Rogers 2004). This simple concept become so popular that Norman has more recently been forced to clarify some of the misconceptions that it has generated (Norman 1999), for example, the idea that an on-screen button will give the "affordance" of pushing if it has a 3D appearance. Despite his re-working of the concept, Norman's notion of affordances is rather different from that of Gibson; specifically, he does conceive of affordances as being possibly dependent on culture or experience, and his main interest in affordances is in the idea that the perception of an affordance is a useful clue for interaction.

Agreeing with McGrenere and Ho, (McGrenere & Ho 2000), this thesis sticks more closely to Gibson's understanding. Although he does attempt to clarify the difference between affordances and culturally-defined conventions used as clues to potential action, Norman's more recent intervention (Norman 1999) still does really distinguish affordances from the *information which indicates the affordance.*

To make this distinction clearly, this thesis takes the view that culturally defined clues to action, whether or not there is a physical device (button, touch-pad) or a symbol on a screen, are not affordances at all, but *genres* (section 2.2.5 below).

2.2.4 Affordances between the social and the technical

The notion of affordances provides a valuable focus to the debates about the relations between the social and the technical. This is not the place to enter deeply into theories of the relations of society and technology, except to the extent necessary to consider limits of interpretability of physical interactions. However, assumptions about the nature of technology need to be critically examined in the sense that they are the underlying motivation behind e-government thinking, and as such impact on the experiences of users of the systems in life.

The anti-essentialism of Grint and Woolgar (1997) is a strong challenge to both technical and social determinism, but the view taken in this thesis follows Hutchby (2001) and Harré (2002), who draw on affordances to soften the "radical" anti-essentialist viewpoint. For Harré, "*a material thing as a social object just is the totality of those of its affordances that the embedding narrative makes available to the protagonists*" (2002:30). Conversely, differing affordances of electronic and other technologies tend to support social behaviour in different ways (Gaver 1996).

(1991; 1988)A sufficiently rigid, level, flat, and extended object resting on the ground at approximately the height of the knees for a human affords sitting. It still affords sitting, even in many cultures where sitting is not done on knee-high objects but on, for example, cushions placed on the floor. Affordances, as Gibson developed the notion, are independent of an actor's experience, knowledge, or culture (Gibson 1979; McGrenere & Ho 2000). Perception is fundamentally non-dualist; there is no separation between a "value-free" physical object and its meaning for an observer; "*awareness of the world and one's complementary relations to the world are not separable*" (Gibson 1979:141).

It is just this cultural independence which makes affordances (as opposed to genres) such a useful resource for analysing possibilities for inter-action without resorting to essentialism. Affordances are not socially constructed, and not socially construct*able*; but the ways in which affordances are put together and made use of *are* constructions in society, and so affordances may be considered at the *limit* of the social.

2.2.5 Genres: technology as text

Extending the concept of documents or "texts" to all communicative artefacts suggests an exploration using ideas from literary theory. Brown and Duguid (1994) use the idea of "reading" an artefact to consider the implications of the *genre* of artefacts.

Genres are not anything very esoteric, but are socially constructed conventions for interpretation of texts (Spinuzzi 2004) and communication (Brown & Duguid 1994). Genres have a "*commonly recognised purpose*" (Orlikowski & Yates 1994:3), in "*recurrent situations*" (1994":4"@4). For example, different genres of organisational communication such as a memo, a note, or a letter, are recognised, usually tacitly, as being appropriate to more or less formal work practices.

The ways people appropriate a genre might not be the ways the designer intended; ordinary daily objects may be used in new combinations as the need arises (Spinuzzi 1999). Orlikowski and Yates (1994) have a useful concept of breaking genres into their *substance* and their *form*. Form refers to the observable, external features, such as a standard meeting format or a standard layout; substance is the contents, such as the topics and themes.

Separating form from substance in this way also clarifies the difference between affordance and genre. As well as conventional uses, the substance of a genre may have particular useful affordances; for example, a map may be easy to read or heavy to carry.

Key concept:	Important points
Borders	Mediate centre and periphery May themselves have useful properties (sounds etc.) Are contextually determined and fluid; the centre in one context may be the periphery in another
Affordances	Are not culturally specific Are relative to a particular actor Are *perceived*: the meaning of an object is not separate from the it But are independent of an actor's perception of it or need to use it
Genres	Are culturally specific Are developed in repeated use But may be appropriated in ways not intended by the designer Have *substance* and *form*; form may also have affordances independent of the genre

Table 2: Summary of Borders, Affordances, and Genres

2.2.6 Ecologies of affordances, information, and genres

The ways in which affordances work together to support action can be considered in as *ecologies*; Hutchins (1995), in the context of navigation, talks of ecologies of tools, an accurate sextant, for example, being useless without an accurate chronometer. Gibson (1977; 1979) is clear that his concept of affordances opens up an *ecological* understanding. Nardi and O'Day (1999) have taken this concept into *information ecologies*, and, for them, the ways in which such ecologies combine the "head" with the "heart" is central to experiences with technology. They draw attention to a crucial aspect of ecologies: ecologies include not only artefacts, but people, practices and values (1999:49). For Gibson, the "*richest and most elaborate affordances of the environment are provide by ... other people*" (Gibson 1979:135).

Genre ecologies (Spinuzzi 2003b; Spinuzzi 2004) emphasise *interpretation* around the perceived affordances, and open up the discussion to genre theory as objects are "read" and appropriated by users.

Ecological analyses are also a way to *defamiliarise* objects (Bell, Blythe, & Sengers 2005). The very familiarity of everyday technological artefacts presents an anthropological need to "*make them strange*", and to call into question common interpretations of them. The previous section reviewed Norman's (1988) affordance

analysis of apparently simple things. This is a useful design method, but it is more than that; it provides the basis for both a critique and a way to consider how things might be different.

2.2.7 Artefacts as resources

Social collaboration mediated by artefacts was discussion in section 2.1.3 above; in intervening in co-operative work, this social mediation by means of artefacts is effectively *distributing* activity between people.

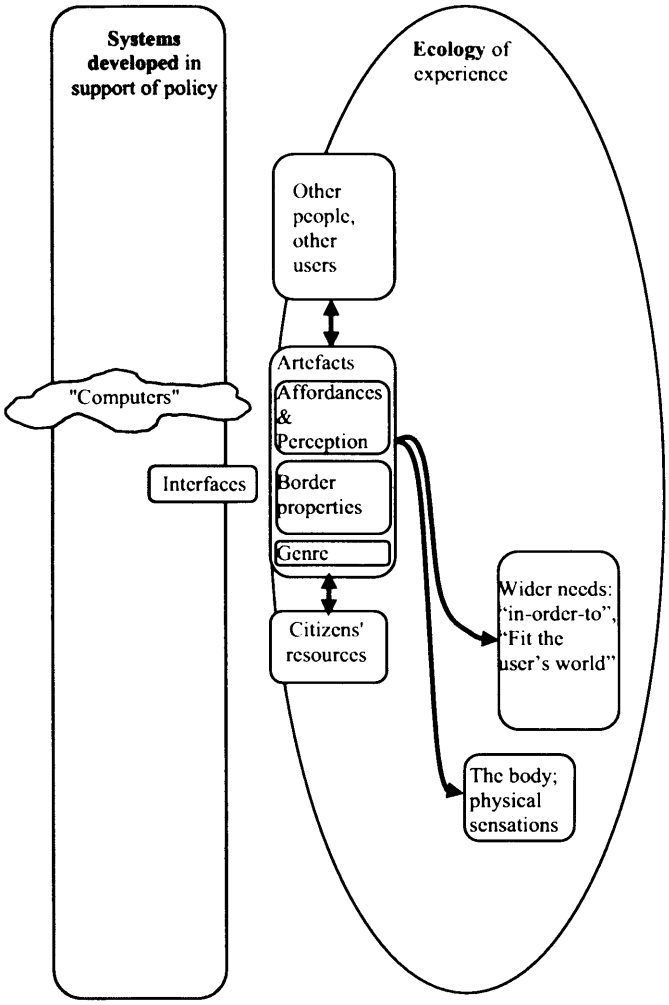
Cognition, equally, can be distributed across ecologies of artefacts; that is, cognition is not only "*in the head*" but also "*in the world*" (Norman 1988); design aspects of artefacts assisting (or not) the cognitive understanding of the user. This leads to a change in focus from the individual user performing a task alone to a network of people and technological artefacts, a perspective taken by research in Distributed Cognition (DC).

Wright, Fields, and Harrison (2000) develop a model of DC drawing on *resources*; their concept of objects as resources for action will be developed later in this chapter (section 2.3.6) and recur throughout the thesis. This, too, is a dissolving of boundaries; physical and social, space and time boundaries, moving understanding beyond the individual, outside the laboratory, into the dynamic processes of activity in context (Hutchins 1995).

When activity is distributed across resources in practices *between* communities, the negotiability of the boundaries suggests the need for relatively stable *boundary objects* to mediate, or span, the boundaries (Star & Griesemer 1989). A simple example is the writing of an article by two authors, each in their own context, mediated by the article itself; this apparently simple solution involves the negotiation of a *shared* context in which to work.

Conversely, the technical requirement for formal systems of classification to enable collective activities, which is typical of information systems but not limited to them, contributes to a parallel social need to set up new boundaries around "*clearly demarcated bins*" (Turner, Bowker, Gasser, & Zacklad 2006:96). Formal technical standards "*take on life*" (Turner et al. 2006:96) in daily practice, creating categories into which the messy realities of life are somehow made to fit (Bowker & Star 1999).

The inter-relationship between "computers", artefacts and their affordances and genre, as resources for action in lived experience, are shown in the following diagram. This extends Figure 2 to expand on interfaces, and artefacts which may also act as interfaces. These are considered in terms of their affordances, border properties, and genres, as resources for action and for "working together" to support the "*in-order-to*" (Heidegger 1962) needs of service users ("citizens" in Figure 2):



Interfaces and other artefacts are part of the environment, but this also includes other people and the user's own experience and resources.

These all work together to support the users' wider needs and experience.

Figure 3: The ecology of experience

2.2.8 Interfaces and everyday life

In all consideration of interactions with technology, it is important to remember that, from the point of view of users, the interaction is merely a part of their daily routine. Section 2.2.1 remarked that, for most people encountering information systems, the existence of the computer is happenstance, incidental to the main business of getting on with their daily lives. Increasingly, these encounters are not only within the

workplace but in the home, in private places and social spaces, and in transient movement between these locations.

At the same time, computer power is increasingly integrated into mundane artefacts (Bødker 1991). There are therefore two related developments: the increasing *pervasiveness* and *ubiquity* of computers, and the increasing *acceptance* of computers as tools for everyday life, and these tend towards, but have not yet reached, the state which Weiser (1991) has described:

> *The most profound technologies are those that disappear. They weave themselves into the fabric of everyday life until they are indistinguishable from it.*

2.3 Interacting with computers in the real world

The previous two sections have considered users as human actors, acting in context, and the artefacts with which they interact as mutable objects with affordances which define negotiable borders between centre and periphery. Computer systems are both technical *and* social objects; this section traces the ways in which people interact with these ostensibly *technological* objects in *social* ways.

Information systems have been widely studied as social systems in the *workplace,* and in particular the ways in which information systems can be designed on the basis of a social understanding of work (For example, Asaro 2000; Checkland & Scholes 1999; Hirschheim, Klein, & Lyytinen 1995; Mumford 1983). Some of this research has had an explicit aim of producing emancipatory systems, that is, of emancipating the *workers* as users of the systems.

However, e-government services are not necessarily in the workplace, particularly if they are "G2C" (Government-to-Citizens). In the case of transport, interactions are often fleeting, in transit. Users of these services, are in some senses "customers", yet are also "citizens", subject to public policy but also with public service expectations; they are heterogeneous, widely varying in their skills and knowledge not only of the interfaces but of the transport system as a whole. These considerations pose new problems in understanding their usability needs.

2.3.1 Users in socio-technical systems

An early set of research into technical and social factors in the *workplace*, which is still an active tradition today, was the socio-technical systems perspective

originating with the Tavistock Institute. By the time of Trist and Bamforth's seminal study (1951), the significance of the *social* and psychological dimensions of work was fairly well accepted; their new contribution was to bring the *technological* aspects back into study, but not to focus on these alone, but to relate the social *and* technological systems (Emery 1972).

There are other seminal contributions which take seriously the *newness* of new technology and its possible significance for the management of organisations (Leavitt & Whisler 1958) and democratic participation (Laudon 1977). This thesis builds on this socio-technical tradition, but, unlike that tradition, the focus here is not on the organisation or even on the user-in-the-organisation, but on the *service* user's situated experiences.

What is especially relevant for the interests of this thesis is that, although usually seen in terms of better systems design and especially of improved work conditions, this early research was very much concerned with the emotional as well as the social impacts of technological changes, and with the human and social values which run through design principles such as those of Cherns (1987).

2.3.2 The turn to practice

What has been called the *turn to practice* is a turn away from the "*hegemonic discursive practices of rationalism*" (McCarthy & Wright 2004:24) towards a focus on technology as experienced in the ordinary, everyday lives of people; the turn to practice provides a critique of underlying rationalist assumptions. In particular, technology in design and use is not rationalistic, despite the prevailing rationalist tradition "*in which we are all already immersed*" (McCarthy & Wright 2004:30). This is not to reject other HCI research traditions such as cognitive modelling, but to "inscribe" insights from phenomenology and other approaches onto it (McCarthy & Wright 2004).

The argument that action is *situated* has largely been accepted in HCI research. It was by observing users in *practice* (although actually in a laboratory) that Suchman (1987) reframed the situated interactions between humans and machines as inherently troublesome and contingent. But, in spite of these early insights, the inter-weaving of technology with prosaic activity remains under-researched, particularly outside of the workplace (O'Brien, Rodden, Rouncefield, & Hughes 2006).

As a practice-based counter to simple cognitive theories of how people think in practice, Lave (1988; 1997) compares schoolroom mathematics with situated practices in the supermarket and Weight Watchers' dieting. Returning to the relationship between cognition and peoples' interactions with technology, Lave criticised the "*'out of context' learning*" (Lave 1997:28) which assumes that abstraction leads to generalisation and thence to cognitive efficacy in later life.

Taking this further, Walkerdine (1997) criticises the privileging of "reason" in its historical context, arguing that the dualism between people thinking and the context fails adequately to theorise either. From a Foucauldian perspective, she finds subjectivity in what could be seen as cognitive practices, and this emotionality signals "*the dreaded irrational or unreason ... lurking beneath the surface of rational discourse*" (Walkerdine 1997:66).

2.3.3 The phenomenological challenge to systems rationalism

There is a further challenge to the rationalist notion that people interacting with computers are following simple procedures and responding to unambiguous communication. Winograd and Flores (1986) drew on language theory for their seminal argument that computer design (up to that time) had been based on a misrepresentation of human cognition so that computers are restricted to "*representing knowledge as the acquisition and manipulation of facts, and communication as the transferring of information*" (Winograd & Flores 1986:78).

Their critique of a rationalistic view of interaction draws on a phenomenological understanding of action; we are "*thrown*" into situations which require us to act: "*We do at times engage in conscious reflection and systematic thought, but ... we are always engaged in acting in a situation, without the opportunity to fully disengage ourselves and function as detached observers*" (Winograd & Flores 1986:71).

Theirs is a second "unconcealment" of the prevailing rationalist assumptions, particularly concerning the simple application of cognitive psychology; it is not that cognition has no place, but that "*cognition is viewed as an engaged activity within a situation*" (McCarthy & Wright 2004:30). Winograd and Flores' contribution remains powerful and influential, despite the criticisms of Suchman (1994) and others that their proposed foundation for design based on speech-act theory

introduces a new form of rationalism and denies the contingency of language in use (Dourish & Button 1998; McCarthy & Wright 2004).

Recalling the discussion of boundaries in section 2.2.2, categories organised around technical needs or some social logic constrain the contingencies of lived experience by rational, universalist assumptions. Winograd and Flores (1986) are similarly concerned with communicative practices. By insisting on a canonical framework for communication, however, they discipline everyday conversation into what Suchman (1994) has called "*technologies of accountability*", the accountability of "*the bookkeeper's ledger, the record of accounts paid and those still outstanding*" (Suchman 1994:188), contrasting with the complexity and heterogeneity of organisational and social life.

2.3.4 The artefact in practice

The move away from focussing on what Jensen and Søgaard (2004) refer to as "*the-thing-in-itself*" to focussing instead on "*the-thing-in-context*", the questioning of the scientistic assumptions of Information Systems research, and a phenomenological understanding of relations between humans and computers, forced a re-consideration of the theoretical framework of HCI. However, it also suggests some new foundations for HCI, focussing on the physicality of the artefact and on its relation with users in context.

Drawing again on phenomenological insights, it is only in the context of action and use that something *becomes* an object or "*thing*" (Dreyfus & Spinosa 1997), or, as Bannon and Bødker put it, "*reveals itself fully*" (Bannon & Bødker 1991).

"Things", though, are not simply the single artefact, but are linked to other artefacts. Section 2.2.4 looked at this linking in terms of ecologies of affordances. In this section, a phenomenological perspective is concerned with the encounters between people and objects, and the "becoming-ness" of things.

Equipment (*Zeug*, a German word which has no exact equivalent in English (Heidegger 1962)), in this sense, is not simply a tool, but a tool for some task (Dourish 2001), or "*something in-order-to*", in Heidegger's (1962) terms. The user is not particularly concerned with the artefact itself; it is "*ready-to-hand*" (*zuhanden*, *Zuhandenheit*). Heidegger (1962:98) says that the use to which the equipment is put (a nail and a hammer for hammering, in his well-known example)

has "*appropriated this equipment in a way which could not possibly be more suitable*".

However, some breakdown, to use Winograd and Flores' term (Flores, Graves, Hartfield, & Winograd 1988; Winograd & Flores 1986), might cause the object to move into the foreground of the user's attention; something might be broken or missing; it is less "*ready-to-hand*" and "*all the more obtrusive*" (1962:103), or "*present-at-hand*" (*vorhanden*, *Vorhandenheit*), in Heidegger's terms.

An analogous although different conception is Ihde's (1979) notion of a shift in attention as a shift from transparency to opacity, from "*embodiment relations*" to "*hermeneutic relations*", from experience through a machine to experience *of* a machine:

(Human-machine)->World = "*Embodiment relations*"

Human->(machine-World) = "*Hermeneutic relations*"

In the second case, there is a partial opacity between the machine and the human; the focus moves more towards the machine and in this sense "*the machine is something like a text*" (Ihde 1979:12). A "*text*", that is, for the human, not for the researcher; nevertheless, this suggests a metaphor for understanding the ways in which humans relate to objects.

2.3.5 Appropriating artefacts

The point, though, for Ihde (1979) is that "*the use of technology is non-neutral, it transforms experience*" (Ihde 1979:53); experiences *through* technology or *with* technology can be expressively exciting, as (his example) when seeing the mountains of the moon through a telescope.

On a more practical, concrete level, technology and artefacts of all kinds may be appropriated in a form of *bricolage*, a taking of "*whatever is at hand*" (Lévi-Strauss 1966:17) rather than raw materials and tools procured specifically for the project.

For Lévi-Strauss, *bricolage* refers to a more "primitive", prior, or "mythical" thinking, a "*science of the concrete*" based on what is available, compared with a scientific or engineering, planned, or conceptual mode of thought. Nevertheless, *bricolage* is a valid way of understanding things; people interacting with computers

are not attempting to establish universal principles, but to overcome daily problems, and so a *bricolage* approach is entirely appropriate.

This concreteness, and the concept of using physical objects in unintended but inventive ways, has been remarked on by researchers such as Turkle and Papert (1991). Similarly, Orr (1996) found that photocopier repairers, although seen by their employers as undertaking routine work, are actually highly skilled in using "*noncanonical*" (Brown & Duguid 1991) practices to overcome intractable problems.

2.3.6 Overcoming problems in everyday life

The insights of ethnomethodology, itself built on the phenomenology of Schutz (1972), add to the re-thinking of interactions between humans and machines. In a reversal of the view which considers contingent circumstances to be epiphenomenal, ethnomethodology suggests a close look at the details of the ways in which people are able to make coherent sense in interaction with machines, overcoming problems and using them towards practical ends.

Building upon ethnomethodology, Suchman (1987) provides a powerful critique of the notion that humans act according to clear plans from an initial state to a well-defined goal. And even to the extent that people do have clear goals, in going about their daily routine there are, to draw freely on Garfinkel's (1967) term, "*normal, natural troubles*" to be dealt with, troubles which are inevitable in the routine activities which are the focus of ethnomethodological research (Garfinkel 1967; Randall & Hughes 1995).

As a form of communication, human conversation is a process of collaborative sense-making (Suchman, Blomberg, Orr, & Trigg 1999). This suggests a different approach to human interactions with computers; rather than considering procedures as like a computer program which can simply be followed, procedure following is a process of making meaning and *sense* requiring the use of pragmatic intelligence. In this view, procedures and plans are *resources for* action (Dourish 2001; Suchman 1987; Wright & McCarthy 2003).

Norman's (1988) introduction of the concept of affordances into HCI, discussed in section 2.2.3 above, provides a parallel to these insights; goals and intentions in everyday life are not necessarily well-planned, but opportunistic, taking advantage

of objects in the environment. Design of computer systems, too, although often seen as a thoroughly rationalist process, is more often a "*messy, ad hoc, atheoretical activity*" (Coyne 1995:32).

However, what both the ethnomethodological and the affordances viewpoints lack is the dimensions of *meaning* or *feeling* (McCarthy & Wright 2004). Although lost in translation, meaning or feeling is fundamental to the original phenomenological conception of situatedness as *Befindlichkeit* (Ciborra 2005), drawn from Heidegger, carrying with it a sense not only of circumstances but of how the person *feels* in their situation.

2.4 From practice to lived experience

The developing concept of the user as social actor together with a careful understanding of the ways in which people actually encounter technology in everyday life call into question Zuboff's (1988) analysis that "*informated*" work leads to a progressive loss of concreteness. This is not so much to refute her insights as to suggest that concreteness is re-established in new ways. The mind may be empowered or controlled by abstracted information, yet these remain essentially *embodied* encounters (Beeson 1997; Dourish 2001).

2.4.1 Felt experience

The body is "*the mind's first home*" (Beeson 1997:218); *lived* experience with technology, embodied and situated, is *felt*. Bodily encounters with technology are felt physically through sensual experience, and felt viscerally as emotional and aesthetic experience (McCarthy & Wright 2004). A pragmatic orientation does not regard the physical as subservient to the theoretical, but on the contrary engages with the materiality and "*physical presence*" (Coyne 1995:34) of hardware.

The widely-used term "user experience" captures some of this meaning, but still retains the centrality of the computer and of the human as a "user" of the computer. The *lived* experience goes beyond this to include the context and environment, and an array of objects and activities, each with sensual, emotive and aesthetic qualities. Lived experience includes the social user's own experience, capabilities, and values (Forlizzi & Ford 2000), but also users' sense of agency, that is, of having a desired effect *and* having a sense of self (McCarthy & Wright 2005a).

In a reversal of the metaphor which places impersonal cognition at the centre of interactions and experience on the margin, McCarthy and Wright (2005a) argue for placing *felt-life* at the centre of HCI. Such re-arranging of centre and margin also throws new light on cognitive and intellectual processes, and on those aspects which a cognitive-centred approach finds intractable and which are particular concerns in e-government services: resistance to a technical system (for example, as considered by Markus (1983b)) possibly leading to antagonism (Laclau & Mouffe 2002).

2.4.2 Perspectives on experience

Research into technical practice might seem naturally more suited to a rationalist, cognitive approach than to an attempt to focus on lived and felt experience (McCarthy & Wright 2005a). Moreover, there is a risk that such an attempt can raise difficult questions as to where to set the boundaries, how to understand experience without being either unclear or reductionist (Blythe, Reid, Wright, & Geelhoed 2006). This section presents some perspectives which are used in this thesis to provide a coherent understanding of experience with technology.

Optimal experience consists in deep sense of enjoyment from activities which are worth doing for themselves, rather than as means to an end. Activities are neither too boring nor too challenging; there is what Czikszentmihalyi (1991) terms "*flow*". Although many mundane situations are not obviously absorbing in the way that work or a hobby might be, nevertheless they hold possibilities for pleasure or for frustration; there are "*some people who have a good time waiting at a bus station, while others are bored*" (Czikszentmihalyi 1991:88).

Wright McCarthy and Meekison (2003), McCarthy and Wright (2004) and Sullivan and McCarthy (2004) develop a framework for understanding based on four "*threads*" of experience. The *compositional thread* concerns the part-whole structure of an experience, perhaps a narrative structure or the composition of an image. The *sensual thread* concerns the "look and feel" and other sensory engagement with a situation. The *emotional thread* includes both stark emotions such as anger and joy, and more subtle feelings such as fulfilment and satisfaction; emotions are not just passive responses, because they are one of the motivating factors for action. Finally, the *spatio-temporal thread* places actions and events in a particular time and place, for example being in a rush or being in a public or private space.

It is important to be clear that *felt life* is an integral part of experience. This is engaged action, not only at the electronic interface but as computers interweave and reverberate with other computer- and non-computer interactions. Experience as understood here accepts the subjective dimension as integral to interactions with technology and as a worthy topic of research, but felt experience cannot be reduced to the subjectivity because it is not *separate* from the situation (McCarthy & Wright 2004; Turkle 1996).

Although she did not develop this realisation into a full understanding of experience, Lave prefigures the inner and outer meanings (Ciborra 2005) of situatedness in the full sense of *Befindlichkeit* when she asserts that it involves the whole person, acting in context (Lave 1988; Lave 1993). Drawing on the pragmatism of Dewey (1934), the self is always "*already engaged*" engaged with the world; aesthetic and emotional qualities are inherent in the most mundane encounters, as people bring themselves with their own interests into situations, but are also changed by them (Wright, McCarthy, and Meekison 2003).

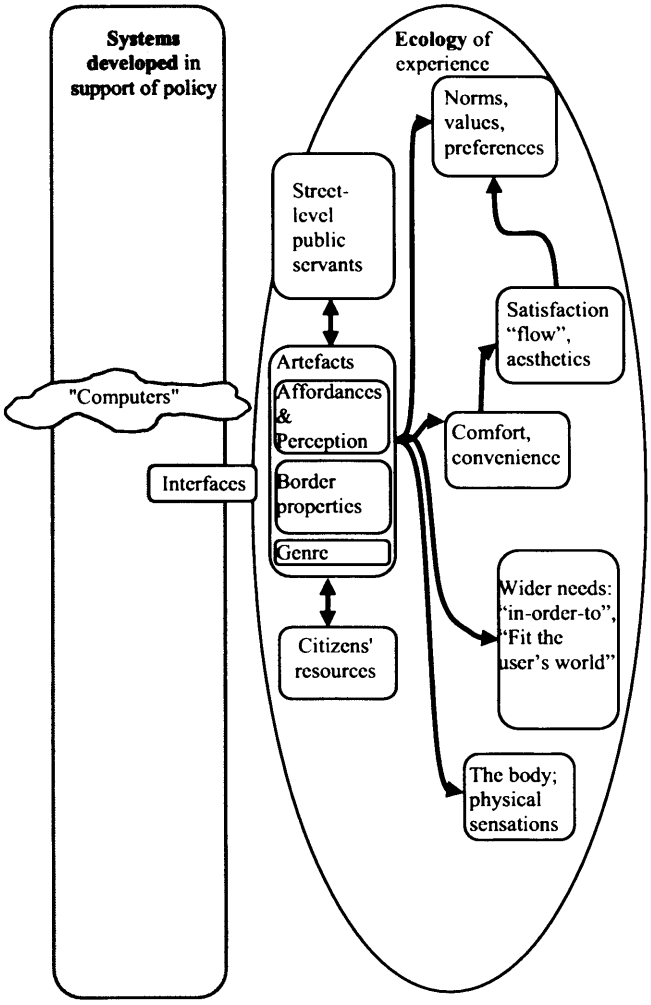
2.4.3 A pragmatist approach

For Dewey (1934) and for Turner (1986), there is a difference to be made between "*mere experience*", passive endurance of events, and "*an experience*", a structured, aesthetic experience. *An* experience stands out from *mere* experience; Turner (1986) suggests major life events or being caught up in a time of social effervescence as examples of "*an experience*", but the "*shocks of pain or pleasure*" (1986:35) which interrupt routine life and signal the start of an experience are also to be found in more mundane events. In the case studies which follow, events are recalled which stand out in the experience of interviewees, from which they make coherent meaning and which are, in small or large ways, transformative of the person.

The signs of society, its symbols and acts, its "*text-as-performance, performance-as-text*" (Geertz 1986) are critical to experiences of this sort. In relation to HCI, Laurel (1993) has understood experiences with computers as being like a form of theatre; and, as in a play, a satisfying experience is well-rounded, with a clear beginning, climax, and ending.

Dewey (1934) understood life as experience by a new opening up of art, rejecting the distinction between high-art and popular culture and seeing aesthetic

experiences in everyday occurrences; Shusterman, following him (much later) realised the emancipatory potential of this aesthetic and that "*the ultimate goal is not knowledge but improved experience*" (Shusterman 2000:xv).



Compared with Figure 3, the rather cold, unfeeling ecology is shown to have meaning in the felt-life of service users

Figure 4: Lived experience

The ecology of experience can now be extended: it is more than the service users' inter-actions in practice, although it *is* that as well; it is also their *Befindlichkeit*, aesthetic whole-ness, and "flow", as well as their values and desires (Figure 4).

Aesthetic qualities in ordinary interactions with mundane artefacts may become *enchantments*, for example in the possibility of exploring vast virtual bookstores when browsing books online (McCarthy & Wright 2003). On the other hand, interactions with technology can also be the occasions for frustration, or for tensions between different constructions and uses of systems.

Section 2.3.6 above considered the pragmatic ways in which people are able to make sense of situations and overcome problems, but alongside their *extrinsic*

meanings as means-to-an-end, events may have *intrinsic*, felt-life meanings, meanings which give them the emotional impact in themselves; the satisfaction or annoyance of encounters which are *both* intrinsically concrete *and* "*emotional-volitional*" (Bakhtin 1993; McCarthy & Wright 2004). Here the pragmatics of Dewey (1934) meets the dialogism of Bakhtin (Bakhtin 1993; Holquist 2002); it is the relationship in encounters between self and other people and other objects which is central to experience.

2.4.4 Technology as dialogue

Interacting with an e-government system, or with any object, text or person, is a dialogical experience, in the sense that "*the object, text or person is not given as a whole but in relational activity*" (McCarthy & Wright 2004:73). There is always a tension between self and other; the self is not static but is continually *becoming* in relation to others. For Bakhtin, the self, in this way, is a triad, not a duality, consisting of "I-for-myself", "I-for-the-other", and "other-for-me". In this triad, the self is the "centre", others are non-centre, but the self is formed in the *relationship between them.* In this simultaneity but separateness of self/other are differences which cannot be overcome; in contrast with the Hegelian ideal of ultimate oneness of consciousness, dialogue "*knows no sublation*" (Holquist 2002:20).

There may be other voices involved, for example colleagues, and this self/other dialogic is a "creative tension". It is in dialogue that meaning is made (Bakhtin 1986) and this meaning is not only intellectual but emotional and valuative (McCarthy, Wright, & Cooke 2004).

Encounters with technology are also continuing, unstoppable; each act is a unique, unrepeatable moment. Emotions felt in these acts are not passive feelings, but *"responsive commitments*" (Hicks 1996:108) to each moment, actively experienced by the *person.* Both the contingency and the moral commitment demanded by prosaic engagement are captured in Hicks' phrase "*moment-by-moment oughtness*" (Hicks 1996:107) in responses to particular situations: "*I, the one and only I, can at no moment be indifferent (stop participating) in my inescapably, compellently once-occurrent life; I must have my ought*" (Bakhtin 1993:41).

For Bakhtin, the continuing and unending potential for meaningful experiences leads to a commitment to *unfinalisability.* In a similar way, for Dewey (1934),

experience requires not only harmony but also disturbance; it is in moving between harmony and disorder that the rhythmic shape of experience is formed.

The dialogical view sees that users of technology change the technology and are also changed themselves; their developing sense-making is a process which is "*open and one of continual becoming*" (McCarthy & Wright 2004:144). For Dewey and for Shusterman, the reader of a text actively reconstructs it, but the text remains central because the reader accepts the experience as "*both receptive undergoing and productive doing*" (Shusterman 2000:55).

This presents a different view on the increasing concern in HCI for "interaction design"; users will inevitably make sense of technology in their own ways, and their situated interactions are complex, changing over time, and unpredictable. Wright McCarthy and Meekison (2003) conceive of experience as being as much a product of what the user brings to the situation as it is about artefacts. In this sense it is not possible to *design* an experience; but it is possible to "*design for an experience*" (2003:52).

2.5 Conclusions: towards an inclusive understanding of usability

It is now possible to make good the three claims with which this chapter opened:

1. that a concept of usability, viewed separately from the context of use in which technology is encountered, is meaningless;
2. that a clear understanding of the changing nature of the artefact, of the situated user as whole person acting in their environment, and of the negotiable, contingent boundaries at which they meet, is only now emerging in HCI;
3. that such a viewpoint regarding the inter-relations between humans and society is essential for an understanding of the lived experiences of people in systems in support of public policy.

Further to this, the foundations are in place for an understanding of lived experience, and for a methodology for investigating it in practice.

The review of the literature on usability, the conclusion that usability and user experience are inseparable, the systems viewpoint, and finally the breaking down of rationalist understandings of interactions, form the basis for a detailed study of the

ways in which technology is woven into the daily lives of people. This is the *lived experience* with technology, and it is to be illuminated by an investigation of peoples' practical, mundane encounters. These encounters are physical and sensory, but also intellectual, and these experiences engender feelings of satisfaction or frustration, and reactions of appropriation or resistance.

The review in this chapter has provided a theoretical development of the phenomenological critique of rationalism, of an ecological analysis of affordances as a way to see mundane objects from new perspectives, and of a dialogical concept of interaction. This provides the tools with which to interpret these experiences, which chapter 4 will develop as a practical methodology.

A review of existing e-government research from both HCI and systems viewpoints, and implications for public policy, is the topic of the next chapter. As will be shown, although there is research into usability in e-government, this has not, up to the present, taken the lived experience approach which is developed here.

Chapter 3
e-Government: Information systems in support of public policy

The previous chapter presented a view of usability and the lived experience with technology without reference to any particular application area. This chapter addresses the specific application area which is the focus of this thesis, e-government in public services. More specifically, public services in urban transport; so a review of the literature on e-government, and of information technology in government more generally, leads to a more particular review of the government services literature, and of transport as a policy area.

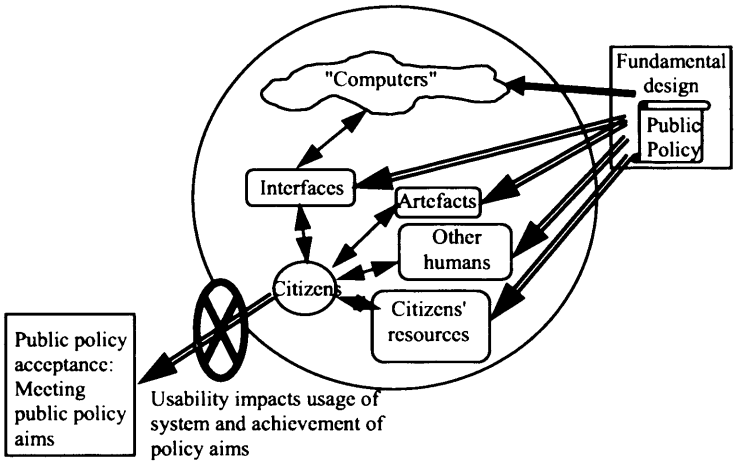
Most of the literature on public sector reform is concerned with reform *within* and *between* public sector organisations; this review, however, extends this to the situation of citizens and others interacting with government services.

The way in which these interactions are understood in this review goes beyond what is commonly considered. These are dialogical inter-relations on the boundaries between the technical and the non-technical, to be viewed without falling into the essentialist assumptions which were rejected in the previous chapter. Following this dialogical reasoning, usability is understood not as narrowly focussed on the computer interaction, but as a lived, emotional and volitional experience.

3.1 Technology in support of policy aims

Section 1.2.1 sets out, as a basis for further investigation, a simple conception of the ways in which public policy impacts on, and is constrained by, users' experience of systems in support of policy aims. In order to understand how usability might impact on the achievement of policy aims, however, it is first necessary to clarify in what ways technology might support policy. Once this is understood, the way should be clearer to identify ways in which this support might be compromised by positive or negative lived experience. This section does not attempt to provide a comprehensive view of the many theories which consider how government achieves policy aims, but does look at a number of viewpoints which will later be drawn on to suggest ways in which policy and usability interact.

In the previous chapter, a rationalist understanding of goals in interaction with technology was called into question; this also has implications for behaviours in organisations, since in reality organisations generally do not conform to the rational model (Heeks & Bhatnagar 1999). Models of policy which assume that there is a simple causative relation between policy, technology, and outcome, therefore need qualification.



Beyond the circle, public policy design informs the implementation of information systems directly or indirectly, and in turn influences the citizen's interactions with interfaces, artefacts, and other people. This impacts on the usability of the system as a whole; and good or poor usability supports or challenges the achievement of policy aims.

Figure 5: Technology in support of policy: extension of a user's interface to a computer

It is worth clarifying here aspects of e-government policy which this thesis does not cover. This thesis does not regard e-government as separate from policy, but rather is interested in e-government *in support of* policy, particularly, in these case studies, transport policy. On this basis, unlike some earlier research (for example, McIver and Elmagarmid (2002)), it is not about policies *of* e-government, e-government deployment, or infrastructure.

3.1.1 Policy in action: changing citizen behaviour

One of the ways in which government attempts to implement its policies is by encouraging citizens to change their behaviour in various ways. Much e-government research considers behavioural change in terms of necessary change to government organisation (supply side) (for example, Curthoys and Crabtree (2003)); however, the interest here is in the potential of e-government to encourage change on the part of citizens and other *users* of government services.

Technology in itself will not change behaviour (Jones & Williams 2005), but government might attempt to change citizen behaviour, for example through information provision. Another way in which government might attempt to change the behaviour of citizens is by making the preferred behaviour more attractive (cheaper, more convenient, more pleasant) or by making the less-preferred behaviour less attractive.

Such a co-ercive approach relates only to extrinsic, externally impelled motivation. Self-motivation, an intrinsic desire to behave in a certain way, is associated with autonomy rather than control (Deci & Ryan 1987; Ryan & Deci 2000), and from factors such as interest and enjoyment. Christiansen and Nyvang (2005) argue that intrinsic motivation is an important part of encouraging use of e-government services, but they noted a lack of concern on the part of policy-makers for this aspect.

3.1.2 The tools of government

A more comprehensive way of conceptualising how governments can achieve policy aims is as "tools" of government (Hood 1983; Margetts 1998). Hood's $NATO^2$ model suggests that government has five broad kinds of "tools", and two kinds of tasks, "detectors" (ways of finding information) and "effectors" (ways of getting things done). The five tools (Hood originally had four; the separation of "O^1" and "O^2" is a refinement by Bastow Dunleavy Margetts and Tinkler (2000), from whom this summary is adapted) are:

- Nodality, which refers to government's central position; civil society actors pay special attention to government messages.
- Authority, which refers to the ability to compel compliance,
- Treasure, which refers to the ability to raise taxes and other resources such as the time of conscripted personnel, and
- Organisation, which is considered to have two parts. Organisation 1 is the capability to run basic bureaucratic organisations. Organisation 2 - Bastow et al.'s refinement - refers to the accumulation of specialist expertise in organisations.

Information technologies affect fundamentally the ways in which the government uses different tools (Margetts 1998), and there are policies which simply could not

be implemented without complex computer systems: an early example is the privatisation of electricity companies, which is also an example of an "effector" of the Treasure "tool" of government (Bastow, Dunleavy, Margetts, & Tinkler 2000).

However, powerful as the command-and-control instruments of government may be, for longer term *cultural* change the apparently more "weak" tools of persuasion and public information, amongst others, are more powerful, if rather more long term in their effects (Perri 6 1997).

3.1.3 Behavioural change in transport

The imperative to encourage behavioural change in transport use is particularly clear, and reflects a change in policy discourse from "*predict and provide*" towards a "*new realist*" agenda (Vigar, Steele, Healey, & Nelson 2000) for more sustainable, balanced transport use. Along with these policy changes has come increased local and regional responsibility, and, at least in London, there are clear discourses in favour of sustainable transport.

For example, under the terms of the Greater London Authority Act 1999, the Mayor of London is required to prepare a transport strategy and develop policies for "*the promotion and encouragement of safe, integrated, efficient and economic transport facilities and services*" (Greater London Authority Act 1999:Part IV Chapter I Para 141(1)).

As transport consultants Steer Davies Gleave (Select Committee on Transport 2002) express the central issue: "*There are many different problems that the [Department for Transport 10 Year Transport Plan] aims to address but fundamentally they focus on the fact that too many motorised vehicles are in use on the roads at the same time—such that congestion results*". Road congestion is a problem everywhere, but particularly in London.

Steer Davis Gleave suggest that people are prepared to change their travel patterns if they understand the choices available, if those choices are real, and if they have the knowledge to exercise that choice. This provides, they argue, a more socially acceptable approach than financial or other co-ercive ("push" or "stick") measures. Along similar lines, Collins and Chambers (2005) consider "*cost, time, and access factors*", as well and individuals' concern for the environment, in determining travellers' choice of transport mode.

However, in most urban situations, situational factors are in themselves complex and depend on usability and the lived experience of transport use. Steg and Tertoolen (1999) nuance this argument with the realisation that both "push" and "pull" strategies are based on implicit assumptions about the determinants of behavioural change, that is, that people behave in a reasoned way. These simple assumptions need to be challenged across a number of dimensions. An obvious point is that subjective factors such as speed, comfort, and flexibility are at least as important as financial considerations in determining car use and other transport choices. So it is not simply a question that behaviour will change if car use "*can be made more expensive and the use of alternative means of transport can be made cheaper*" (Steg & Tertoolen 1999:64).

For the Mayor of London's Transport Strategy (Chapter 4P: Integration: The Seamless Journey) (GLA 2001e) "*changing travel behaviour by making improvements to alternatives to the car*" (GLA 2001e:4P.28) is an underlying theme. As will be shown in the case studies, specific initiatives in e-government in transport in London have been more direct in making behavioural change part of their stated objectives.

3.1.4 Policy in action: other policy objectives

The Mayor of London's Transport Strategy (Chapter 3: Objectives and Linkages) (GLA 2001b) put forward five overarching objectives:

- To make London a prosperous city
- To make London a city for people
- To make London an accessible city
- To make London a fair city
- To make London a green city

and ten key priorities to implement these, of which *reducing traffic congestion* is the first. Other priorities relate to building up the transport system, increasing integration, improving reliability of all transport modes including cars and delivery vehicles, and improving accessibility.

However, good public services are not only significant as an encouragement to change in public behaviour, but as a contribution to citizen satisfaction, information, and ultimately trust in government as part of *public value* (Kearns 2004). From this

point of view, usability of public services is not only necessary to support their behaviour-changing capacities, but also in its own right.

3.2 e-Enablement and public services

In the previous section, ways in which government might achieve policy aims were outlined, with a particular consideration on encouraging behavioural change on the part of citizens, and a start was made in showing the implications of e-enablement for such changes.

In this section, these ideas are developed further. In particular, the potential of e-enabled services in support of policy is investigated. First, as a basis for this investigation, the underlying concepts of transformation in e-government generally must be clarified.

3.2.1 e-Government as transformed government?

It has been realised since (at least) Hammer's (1990) evangelism for Business Process Re-engineering, calling on management to "*obliterate*" rather than to automate, that processes in organisations with information systems are not simply the same existing processes perhaps running faster; it is necessary to revisit the overall design and the interactions between processes. This leads to, and arises out of, the discourse of e-government as transformed government, as set out in Heeks' notion, and careful analysis, of "*re-inventing government*" (1999). In a similar way, Fulk and DeSanctis (1995) observe the possible development of "*post-bureaucratic*" forms of administration, such as interactive or virtual forms, replacing traditional hierarchies and strict adherence to rules. On the other hand, e-government and associated transformations may be critical in overcoming a *crisis* in the public sector (Navarra & Cornford 2003).

One of the first high-profile claims of the significance of e-government came from Al Gore when vice-president of the USA and his assertion that e-government includes, but is more than, getting rid of the need for "paper chases", and instigated the US National Performance Review (Gore 1993a; Gore 1993b; Lenk & Traunmüller 2002).

In their transformatory ambitions, information systems developments overlap with, and go beyond, market-oriented reform movements such as entrepreneurial government (Osborne & Gaebler 1992) and New Public Management, even though

information technology is closely inter-related with NPM and with its inherent policy complexity and fragmenting tendencies (Dunleavy & Margetts 2000; Jackson & Curthoys 2001). Information systems, perhaps as part of what Dunleavy and Margetts call a "*Digital State*" paradigm, hold the possibility of a Web-enabled public administration which could support integration where NPM tends to fragment, and increase citizen competence through simplification rather than diminishing it through complexity (Dunleavy & Margetts 2000).

The crucial but often overlooked point is that this transformative potential is tempered by number of factors. It is the *detailed nature* of the transformation at the level at which it is experienced by users which is of interest in this thesis; simply asserting that there will be transformation raises many unanswered questions.

Central to the interests of this thesis is that aspect of e-government transformation which extends beyond intra-government transactions to services and exchange between citizens and government (Kubicek, Millard, & Westholm 2003; Swanson 1994). Transformation in these public services, the points at which citizens and government meet, is examined critically in the following sub-sections.

3.2.2 Empowering and engaging the e-citizen

The term "dis-intermediation" is often used in e-commerce to describe the supposed merging of the processes of finding, transaction, and supply of goods and services in e-commerce, and perhaps the removal of market intermediaries. On this basis, e-government could make government more open and closer to the people (Dutton 1999). Mansell and Steinmuller (2000) explain this notion, and critique its mythic status, particularly clearly. In the case of e-government services, some of the same considerations apply as for other non-material products, and, as with financial services for example, there may be cases where the service provider prefers to operate through a retail network rather than directly.

E-Government raises the possibility of a "*new service model*", in which the citizen, with the aid of ICTs, is able to do for themselves what previously they would have had to rely on a civil servant to do (Grönlund 2002); thus interaction with government services is *apparently* no longer mediated. However, there is still intermediation: what seems to be dis-intermediation is really re-intermediation by electronic media. Unlike interaction through a window clerk, the citizen makes their

own selections and in this sense is "electronically re-intermediated" with government. This is Chadwick and May's (2003) "push" or managerial model of e-government, where information is (and services are) provided by the state, but the onus is on the citizen to access it (and them).

Among other considerations, if a user, or a citizen, is expected to complete a transaction without other human assistance, then this relies on the self-motivation of the user - and this, in turn, on the quality of their experience. Engagement of the user in e-government interactions, therefore, is not only a factor in wider behavioural change, but also in furthering acceptance and use of e-government.

3.2.3 e-Government centred on the citizen

Developing these ideas from public policy research, Lenk and Traunmüller (2002) assert that public administrations will eventually appear to the citizen as single entities accessed through a "portal" or "window". Perri 6 (1997) goes further, foreseeing one-stop shops becoming the principal means by which the public deals with government. This is, for the citizen, an appearance of "joined-up" government, providing a simple unified interface. Wimmer and Holler (2003) note a significant changed orientation in interaction with e-government portals: a service-oriented rather than a task-oriented presentation which implies, among other considerations, that the user does not need to understand the functional organisation of public administration.

In a similar vein, Transformational Government sets out a vision for services to be "*designed around the citizen or business*" (2005:Section 21). In practice this is said to mean implementing Customer Relationship Management systems and one-stop shops, and to use technology to provide more choice and personalisation.

However, despite claims to place the citizen, user, or customer at the centre of design, phrases such as transformation "*Enabled by Technology*" (Cabinet Office 2005) suggest that the focus is still clearly on the systems. These ideas clearly also rest on simple notions of dis-intermediation which were refuted in the previous sub-section. This is not to deny that technology enables and perhaps impels such changes. However, in this view, the citizens and other users are thought of as factors to be re-engineered, rather than as full human beings.

3.2.4 Openness and closure in public services

However, the *re*-intermediation argued above has deeper implications for the dis-intermediation theory; it necessitates a close look at the intermediaries. Section 3.2.1 above has suggested that the transformatory potential of e-government may be qualified at the level of the details of the experiences of service users. In terms of the openness of relations between government and citizens, the Weberian ideal of "*street-level*" civil servants mediating between citizen and government, acting under law and subject to judicial correction, may be replaced by decision-making programmed into computers, and thus not subject to human, or contingent, intervention (Bovens & Zouridis 2002; Snellen 1998).

Although computers cannot, and probably never will be able to, formulate the kind of reasoning which is the basis for legal-rational decisions, Bovens and Zouridis (2002) and Zouridis and Thaens (2003) suggest that public administration practice, faced with the possibilities offered by e-government tends to replace legal-rational with administrative-technical processes, with implications for democratic oversight. This is another echo of the Cartesian world-view, and of the processes which, in the workplace, "*theoretically reduce the skills of users to what can be formally described*" (Ehn 1988:51). Zuurmond (1998) has described this as a tendency towards "*infocracy*". It could be thought that such a tendency fulfils a Weberian (1947) ideal; but, for Weber, pure bureaucracy is an *ideal type*, not something which can be, or perhaps even should be, found in actually existing systems of authority.

For the citizen encountering government, infocracy in e-Government could imply closure; for example, e-enforcement uses electronics in an attempt to prevent "*strategic*" evasion of offences. Investigating this aspect, Bovens and Zouridis (2002) studied speed cameras, while Koopmans-van Berlo and de Bruijn (2003) studied enforcement of tachograph violations and over-weight lorries. However, they found that e-enforcement does not prevent strategic behaviour and actually stimulates some new forms of it.

They suggest that an enforcement style based on co-operation between obligatee and government, rather than compulsion and unilateral co-ercion, remains appropriate, along the lines suggested by Alford (2002). This has clear implications for governments aiming to call on technology in support of policy aims; a

confrontational approach drawing on the capacities of technology may not be the most appropriate.

3.2.5 e-Government as service provision

A consideration of government in terms of public services follows on from the "tools" of government; in this case government implements its policies through the "Organisation", and through "Network", by providing services in such a way as to encourage certain activities on the part of citizens, through "Authority" by requiring citizens to take certain actions such as submitting a tax return, and through "Treasure" since government might use financial incentives or dis-incentives to support services in support of policy aims.

One important reason to look at e-services is that this is the electronic space where most citizens come most often into contact with government. By "services" is meant most of the routine interactions which citizens make with government: submitting tax forms, renewing licences, etc, which for most citizens are not so much a service as a nuisance (Lenk & Traunmüller 2002), as well as publicly-provided services such as public transport.

Public services are at the heart of the Modernising Government programme (Cabinet Office 1999); chapters are devoted to services which are responsive and high-quality "*as experienced by users*" (Cabinet Office 1999:35) as well and efficient. Good e-services also have democratic significance: democracy needs efficient services, and the public service ethic is a part of open democratic government (Millard 2002; Watson & Mundy 2001).

3.2.6 From service provision to citizen satisfaction

A "service-delivery" approach is often all that is seen of e-government (Lenk & Traunmüller 2002), for example in early National Audit Office reports (NAO 2002b). Nevertheless it is wrong to see a sharp divide between services and other aspects of government; as the previous sub-section outlined, services are an important part of government's work, and services and democracy are intertwined. The point is not to focus on services alone, or on electronic provision of existing services, but to consider services in support of desired outcomes (Kearns 2003). This leads Kelly, Mulgan, & Muers (2002) to discuss the differences between public

and private values; *public value* is not necessarily based on individual utility but also on wider public goals.

From the public value viewpoint, public services are recognised as an important creation of government, alongside regulation and other activities. As Kearns (2004) understands it, *high quality services* are an important part of public value in their own right; and beyond measuring services in terms of inputs and outputs, cost, and availability, high quality services are also seen to include softer aspects such as satisfaction and fairness. Wider *policy outcomes*, such as "*peace and security*", "*public health*", or addressing environmental concerns, also contribute to public value; these are supported by high quality services, but also in other ways and as such are a distinct source of public value. The third source of public value is *trust in public institutions*, which, as discussed in section 3.3 below, is also at least partly built on the experiences of service users.

The concept of public value provides the wider context for the services of TfL. Services provided in support of public value are accountable, in contrast with both market and top-down control models

This contrasts with views such as that promoted by New Public Management, which tended to see services as functionally defined, amenable to piecemeal changes, and emphasised narrow, cost-efficiency measures over other qualities (Kelly, Mulgan, & Muers 2002). As Navarra and Cornford (2005) argue, models drawn without sufficient reflection from the private sector fail to found reform on a model of legitimacy and partnership between government and citizens. The need for legitimacy also underlines the importance of good quality services. Trust in government institutions is likely to increase public acceptance of government action; conversely (although this relationship is under-researched), good service quality and general perceptions of government competence may lead to increased levels of trust (Kearns 2004).

There are different categories of service, as outlined by Wimmer and Holler (2003), from the most routine to the most weakly-structured, but these categories are not hermetic. In particular, although the cases studied here involve mainly processes which could be placed in the routine category, individual action by "street-level" public servants is still necessary to handle contingencies, raising again the questions

of openness and closure in abstracted systems encountered in situations which are contingent, immediate and embodied.

Thus, as Figure 6 illustrates, the *quality* of services is a crucial factor both in terms of public value in the front line of interactions between government and citizen and in terms of the achievement of policy objectives (Kearns 2004). Kearns considers quality in terms of availability and satisfaction including customer care, level of information, and choice of access channels. Kelly et al. (2002) consider user satisfaction as critical to public value. They draw on private sector research to analyse satisfaction across a number of factors (attentiveness, availability, and others). However, none of these factors quite encapsulates the *lived experience*, as it has been understood in the previous chapter.

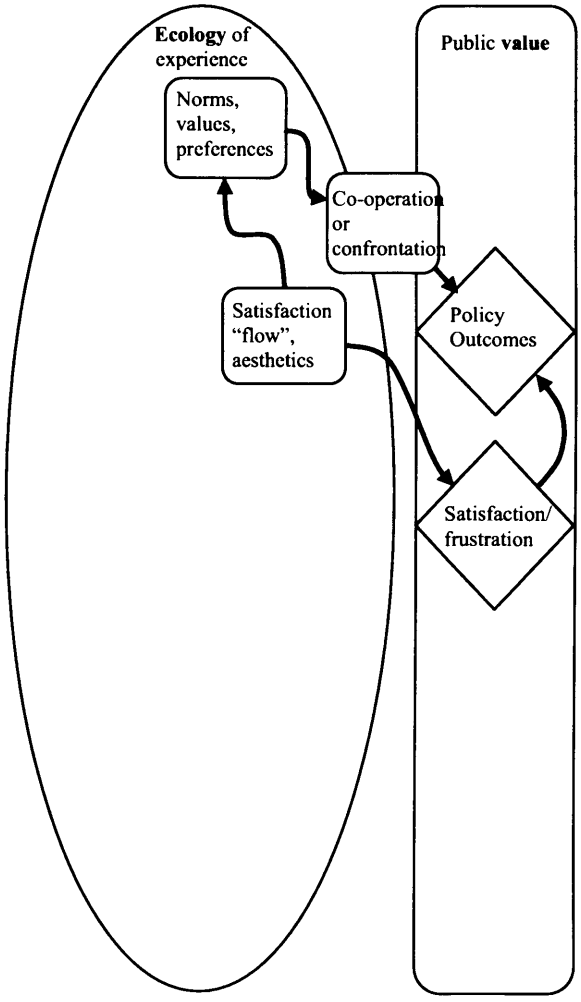


Figure 6: Satisfaction, values, and co-operation supporting policy outcomes

In Kearns' (2004) analysis, other factors of quality services, such as whether the service is considered to be fair and the cost is felt to be reasonable, contribute to the public perception of quality services. Relating this analysis to the account of experience developed in the previous chapter, using a public service is an emotional and volitional *act*. And, and as such services are increasingly mediated electronically, understanding lived experience requires a deeper understanding of interactions with computers. As interactions with technology are more and more interwoven into everyday life, so this understanding must be more and more based not on the interactions alone, but on the lives of which they are a part.

3.3 Trust in public services

3.3.1 The importance of trust

There is an increasing realisation of the importance of *trust* in relations between disparate groups. This is inseparably bound with the conditions of late modernity from which no-one can opt out; essential parts of day-to-day life rely on trust symbolic tokens such as money, or in *expert systems* which integrate the knowledge of experts (such as architects, lawyers, systems designers, programmers) who are usually separated from experience in space and time (Giddens 1990).

This applies to many situations, not only to those which are mediated by electronic information systems; however, electronic mediation may increase the space-time separation, but, conversely, may also provide new opportunities for building trust by establishing reputation, for example in the case of e-commerce sites which encourage their users to provide ratings of third-party suppliers or products (Corritore, Kracher, & Wiedenbeck 2003; Riegelsberger, Sasse, & McCarthy 2005)

3.3.2 Building trust

Trust *derives from* faith in the reliability of a person or system (Giddens 1990), or, to use a concept developed by Bourdieu (1986) and by Fukuyama (2000), trust is a manifestation of *social capital*, that is, "*an informal norm that promotes co-operation between two or more individuals*" (Fukuyama 2000). A person is trusted because they are part of a group, within a "*radius of trust*", in Fukuyama's terms. In this sense, all trust is blind trust (Giddens 1990). The radius of trust may be small (a family or tribe, for example), or may extend beyond the group; in modern societies there are many interlocking and overlapping radii of trust.

Trust, or at least co-operation, can also be engendered by contextual properties, such as incentives to fulfil an obligation, but this is not trust properly so called, but *reliance*; in this sense, all true trust is blind trust (Giddens 1990).

However, building reliance rather than trust in the absence of social capital can be costly and inflexible, since trust built only on contextual properties involves *a priori* definition of fulfilment and non-fulfilment, continual interactions, systems of identification and traceability, and legal and other forms of enforcement (Riegelsberger, Sasse, and McCarthy 2005).

Social capital therefore has an important *economic* function, to reduce transaction costs, and remains important even in modern societies in which it is often supposed that informal ties are gradually replaced with formal ones, since no contract or bureaucratic rules can specify all contingencies (Fukuyama 2000).

Trust arises from social capital, and also builds social capital; however, breakdowns in trust erode social capital. Trust is therefore necessary for the achievement of *community* objectives, and for the engagement of individuals in community institutions.

However, as Bourdieu's (1986) conception of social capital shows particularly clearly, all capital is accumulated labour; this accumulation takes *time* and is constantly built and re-produced through social institutions and the exchange of valued things, words, gifts, and so on. Building social capital in this way increases trust; another way to consider this is as the building of intrinsic trust properties, their ability to fulfil, their benevolence, and their internalised norms, in the trusted person (Riegelsberger, Sasse, and McCarthy 2005).

Riegelsberger et al. (2005) suggest a number of ways in which trust can be built in e-commerce; others, for example Nielsen (Nielsen 1999), propose some HCI techniques to signal trustworthiness to a service user. Trust can be built over time through repeated positive experiences where both sides fulfil; but a single violation can destroy this trust; it is "*hard to build and easy to lose*" (Nielsen 1999).

if the user does not receive sufficient information, does not receive the goods or services which they expect, or does not feel in control, or that they are being fairly treated, this may undermine social capital and trust

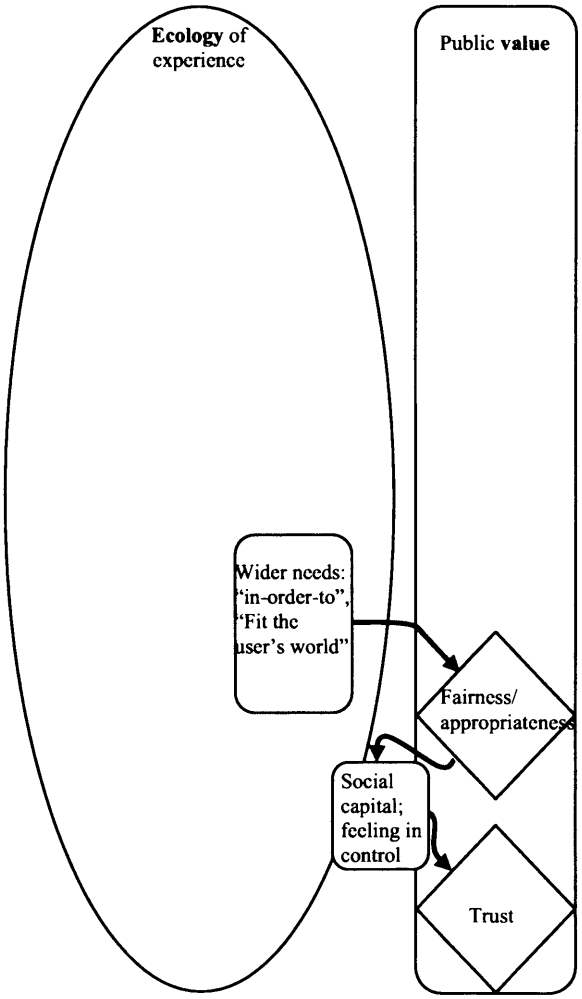


Figure 7: Trust and lived experience in e-government.

3.3.3 Trust in e-government

However, e-government has some fundamental differences from e-commerce in terms of what is *sought* by the end-user, and because services are provided over time (Grimsley, Meehan, & Tan 2005); satisfaction depends not only on whether a good or service *was* provided satisfactorily (perhaps repeatedly), but on a service which *is* continually provided.

So other trust factors are relevant to e-government *as well as* the mechanics of trust (2005) developed in the context of e-commerce.

Grimsley Meehan and Tan (2005) address these by first identifying experiential elements which tend towards positive trust between members of a community and its participative institutions, and then suggest how these might be mediated using ICTs. From surveys in disadvantaged communities, they suggest that three factors are positively correlated with community trust:

1. the extent to which individuals feel that they are well *informed*;
2. the personal *control* which individuals feel they have in their lives; and
3. the extent to which they feel they are able to exert *influence*.

The question for this thesis regarding trust, then, is to consider to what extent government is within service users' "*radius of trust*", and also to what extent government trusts the service users; and whether, building on trust factors as they are understood here, these radii of trust are extended and strengthened, or contracted and weakened, by people's experience with e-government services.

3.4 e-Government as social and technical system

Government is social, organisational, and political; *e*-government is also technical, and so requires an understanding which encompasses all of these aspects, not as separate entities, but intertwined.

Chapter 2 (section 2.2) presented a viewpoint of the shifting boundaries of the social and the technical. It is necessary at this point once again to examine critically suggestions that technologies have inherent properties, this time with a particular focus on the ways in which the possible political implications of different technologies have been theorised.

This section starts by looking at debates around the notion that types of technology have certain *tendencies* to centralise, or de-centralise, control, or to drive organisational transformation in various ways. The critique of these notions is then applied to some of the discourses around e-government; the particular situation of e-government provides a new perspective on these debates, but gives them new urgency because ideas about the ways in which technology can support policy are built, explicitly or implicitly, on wider conceptions of the "politics" of technology, As Bijker argues, "*the stories we tell about technology reflect and can also affect our understanding of technology in our lives and our society*" (1995:1).

3.4.1 Do technologies have politics?

Perhaps the most pertinent way in which technology can be political is when, in Winner's (1986) phrase, artefacts or systems become "a way of settling an issue": bridges are constructed or new machinery is installed to detrimentally affect some groups of people and give advantage to others. More subtly, technology may be the

occasioning for bringing about behaviour change (Wilson 2003). Perhaps more threatening are those technologies which, according to Winner (1986), are inherently political: highly mechanised industry which requires strong, central control; nuclear power and weapons which raise security concerns and are the justification for authoritarian controls. Elsewhere, Winner uses the term "technological somnambulism" (Pratchett 1995; Winner 2004); which describes nicely the fears of Zuurmond (1998) of the loss of democratic control, that human bureaucracy might be replaced by a more powerful "infocracy". A similar fear of early commentators is the "managerial democracy" feared by Laudon (1977).

Technology, then, can be non-neutral, not only when it transforms experience (Ihde 1979) (section 2.3.5), but also when it acts as an ally of powerful interests or favours particular forms of organisation. Various metaphors have been devised to illuminate this non-neutrality of technology, beyond the determinist metaphor of the "impact" of technology. Intentions are said to be "delegated" to artefacts (Latour 1992), or to inscribe designs in a "script" (Akrich 1992). This second metaphor does at least recognise the possibility for actors to "read" the script in ways not intended by the designers or to refuse to play the roles allocated to them (Wilson 2003).

On the other hand, Winner (1986), despite an avowedly political stance, does not allow for resistant "readings" of the cases he studies, nor how these artefacts came to be constructed. Bridges over highways are not simply bridges, but, he asserts, have been constructed by a powerful city planner to prevent the passage of buses; machines in a factory are not simply tools for manufacture but are constructed as union-busters. Yet rather than replacing one, official, construction of artefacts with another, more "political", one, it is more useful to ask why certain constructions are favoured to the extent of eventually taking on the form of hard, physical artefacts, and whether other constructions might have been, or might still be, possible.

The Social Construction of Technology of Pinch and Bijker (Bijker 1987; Pinch & Bijker 1987) is a useful corrective. Avoiding overriding metaphors, they draw on some close and carefully-worked case studies to produce a set of key concepts, in a similar way to the approach of this thesis. The artefact is still central, but this is not a simple object, defined once for all, but an "*interpretively flexible*" object, differently constructed by different social groups, and its eventual form is the outcome of tensions between these constructions.

This is the point of the discussion in section 2.2.4 of *affordances* as a non-essentialist way of understanding artefacts and their possibilities for constraining or enabling behaviours. In Actor-Networks, the non-human and human are equal; in social constructionist accounts, the artefact is still at the centre. Analysing affordance ecologies places the human at the centre; it remains important to understand the artefact, but as a *resource* (section 2.3.6). A careful analysis of the ecology of affordances starts to reveal the range of possible constructions, illuminating those which are hidden as well as those which are favoured.

3.4.2 Or do politics have technologies?

The previous subsection showed some of the ways in which the inter-relations of society and technical have been understood, first at the level of specific artefacts shaped by society, or as actors playing a part or responding to human needs, then on the level of some more generalised theories about the construction of technology.

Such analyses are far more subtle than simple technological or social determinism, but still fail to account for the complexities and the context of technological development and in particular, the development of information systems in social situations (Kling 1999). The processes of developing policy design, and of implementing policy with the support of technological systems, are both complex, and mutually defining. Agre (2002) deals with these issues in various ways but in each case it comes down to a similar issue: the technology cannot be separated from the socio-political processes in which it is embedded.

Computer systems in use are social *and* technical, in that they involve not only, or even mostly, the hardware and software, but also the support structures, circumstances of use, and more or less informal articulations of people and artefacts which enable problems to be overcome (Kling 1999; Kling & Lamb 1999). Kling and Lamb's socio-technical model contrasts a simple view based on a business model with an ecological view in a way which recalls the ecological perspectives proposed in section 2.2.4 of the previous chapter.

In their approach, Kling and Lamb (1999) emphasise the complex political, organisational, and social contexts which embed ICTs in "*a relationship of mutual shaping*" (Sorrentino & Virili 2003:91).

In the public policy tradition, Fountain (2001a) takes a view of the relative strengths of social and technical factors, drawing on (neo)institutionalism to consider that e-government will not fulfil its promise if constrained by unchanging institutions. Analyses which ignore these contextual factors fail to grasp the complexities of moving to digital processes.

The previous subsection unpacked some of the metaphors which have been used to understand the relations between humans and artefacts, and argued that these metaphors may be too simple to describe the world of situated encounters, and tend to distract from the living human beings at the centre of interactions. But taken as heuristics, they illustrate that there are constant breakdowns and the need to "*re-inscribe*" engineering solutions to match the failures of scripts, even in cases of simple tasks (closing a door, ensuring the correct use of a solar panel) delegated from humans to machines.

Nevertheless, the idea that complex organisational processes can be re-designed around "automation" remains prevalent. Hammer's article (1990), for example, signalled the widespread adoption of the ideas encapsulated as Business Process Engineering. In some ways, his thinking is exemplary of the deconstructive rejection of essentialist absolutes; but it replaces one form of absolutism with another, in advocating rapid, integrated or wholesale change.(Scholl 2005; Tsoukas & Chia 2002)

For those who hope that e-government will be in some ways transformatory should consider that, rather than technology "leading to" various political outcomes in any obvious way, change is a process of "*becoming*" (Scholl 2005; Tsoukas & Chia 2002), in which small as well as large developments contribute to deep, permanent alterations. There is "*interpretive flexibility*" (Bijker 1995), but no finalisation, and hence no *closure*, in these processes in which both technology *and* politics are continually shaping one another.

3.4.3 Politics ascribed to technologies: efficiency, convenience, and performance

Yet there remains a prominent stream of technological determinism around models of the political impact of technology, whether optimistic or pessimistic about the potential of the Internet for deliberation, community-building, or democratic

impacts (Agre 2002). Related to this is a view of policy-making as rationalistic modelling (Andersen 1998; Wassink & Kordelaar 1998).

This is prevalent in government literature, where e-government is often seen in terms of expected improvements in efficiency, convenience, and performance. For example, the review by Gershon (2004) into *efficiency* across the public sector looked to ICTs, as well as structural changes in departments and other public sector bodies, for increased efficiency. Some of these efficiency gains are in the back-office or in procurement (NAO 2004), but for citizens and businesses, the most frequent interaction with government is in transactional services, often of a mundane kind such as tax or benefit returns.

According to the UK government's report in which the overall strategy for e-government was set out, "*New ways of doing business will change the relationship between individuals and government*" (Cabinet Office 2000: Executive Summary, para 6). For example, in this discourse, citizens gain convenience and a wider choice of access channels; government gains lower transaction costs and faster interactions (Cabinet Office 2000; NAO 2002a).

Commercial research tends to foreground *performance*, being "citizen centred" and "outcome focused". However, these concepts are in the main used uncritically; there is little definition of what they actually mean in practice, or of potential downsides, such as different access needs of citizens (Accenture 2004).

It is perhaps not surprising that these documents tend to emphasise the advantages rather than the problems of e-government, and where problems are identified it is more in how to implement e-government rather than in implications of e-government as such. A research issue is to clarify whether the changes in the relationships between citizens and government will be more than superficial, and in particular whether this will lead to greater satisfaction with the services on the part of citizens.

3.4.4 Citizens, customers, subjects

Perhaps it is in the hope of increasing efficiency that government has often borrowed the language of the private sector. This approach is said to lead to from "*we know what is good for you*" to "*let us know what is good for you*" (Lips 1998). From an international perspective, the OECD asserts that e-government improves

services by adding a customer focus, and also mentions the significance of e-government for reformed public management, but conflates the two (OECD/World Bank 2003).

Perhaps not surprisingly, commercial research is particularly likely to see citizens and business as "customers" of government (Accenture 2002; Accenture 2003; Accenture 2004; Accenture 2005). The most recent annual Accenture reports on e-government around the world include extensive citizen surveys (Accenture 2004; Accenture 2005; Accenture 2006). Whilst it is encouraging to see that "users" are being given serious attention in commercial research in e-government, the different relationships which citizens and customers have with service providers also needs to be problematised.

Moreover, government is far more complex than most businesses, and has different priorities (Fountain 2001a; Fountain 2001b). Commercial companies are driven by the need to produce profits for shareholders; the provision of goods and services is a means to this end, not an end in itself. Taking concepts from e-Commerce into e-government requires, at least, careful adaptation (Navarra & Cornford 2005; Traunmüller & Wimmer 2003).

A view of the citizen as a customer or at least as a "client" is nevertheless beneficial in some ways. Citizen*ship* is more than what it means to be a citizen .The point is here to consider the "citizen" as a user of information systems; that is, as someone who *relates* to information systems. Even where the citizen is an "obligatee" of a government service, compliance on the part of the citizen is a valuable resource, just as customer revenue is valuable for a private firm, not least because securing compliance against the will of citizens could be extremely costly (Alford 2002).

This raises the importance of "customer satisfaction", the elusive aim of e-government services; Jones and Williams (2005) found satisfaction this to be the key indicator of high-quality services. Yet "satisfaction" is itself a complex of many factors; recall the discussion of ISO 9241-11 in section 2.1.6 of the previous chapter. The recent NAO strategy recognises this, in part, and suggests the appointment of Customer Group Directors to sponsor insight and research into specific citizen groups and policy areas (Cabinet Office 2005).

3.4.5 Equitable access to e-government

No consideration of e-government is complete without the acknowledgement that government services must be available to all, yet there is a lack of access for many people for complex reasons (Coleman 2004; Dutton 1999; Hansard Society 2004a; Hansard Society 2004b). This is recognised by government (ODPM 2001; ODPM 2004); the UK government's "Channels Framework" (Cabinet Office 2000; Office of the e-Envoy 2002) is intended to address this: "*A channel is ... a means for organisations to deliver services to customers. It could be electronic, voice, face-to-face or post.*" (2002:6).

The UK government sees intermediaries, acting in a "marketplace" or "mixed economy", as an important model for implementing channels (2003). But fundamentally, the question of the role of government in ensuring socially just distribution is political, and so public services are in their nature political (Minogue 2000); for example, a market model, and views of the citizen as customer, may fail to address the political questions of access to resources (Fountain 2001b; Kettl 2001).

However, merely providing "access" does not eliminate inequality. As technology is increasingly "domesticated", the more significant divide is between those who are at ease with, and skilled in using, the technology, and those who, for a variety of reasons, are unable to become so (Cummings & Kraut 2002; Higgins 2000). There are cultural, literacy, and usability barriers to access as well as disability (Denman-Maier & Parycek 2003; Mansell 2001; Patterson & Wilson 2000; Stanley 2003; van Dijk & Hacker 2003). In attempts to address this, there have been many initiatives to enable e-government use by people who cannot, or do not want to, use a traditional web browser interface (Moussalli & Stokes 2002).

3.4.6 Barriers to take-up

The impact of e-government depends on the level of take-up (Dunleavy, Margetts, Bastow, Callaghan, & Yared 2002); it has been realised that more would need to be done to encourage take-up of government e-services by citizens to overcome *cultural* barriers (Margetts & Dunleavy 2002). Margetts and Dunleavy draw on four "myths" (based on the cultural theory of Mary Douglas) which underpin responses to technology: cultural attitudes see technology as either "*Benign*", "*Ephemeral*" - terrifying and unforgiving; "*Perverse/Tolerant*" - usually benign but may suddenly

become unforgiving; or "*Capricious*" - anything could happen, technology is random and erratic. Social exclusion is, then, a cultural issue rather than simply a question of internet access *per se*; poorer or less well-educated communities are more likely to subscribe to the "*Technology Capricious*" or "*Technology Ephemeral*" myths. Those who hold these views are likely to believe that e-government is either irrelevant or even damaging for them. Literacy and language skills are further barriers to use, so that marginalised groups continue to be disadvantaged, even if they do have access to some form of internet connection.

Recognising incentivisation as problematic is a central part of a "*socially rich*" (Kling & Lamb 1999) view of digital goods and services. Government has resources which are not available to e-commerce (Margetts & Yared 2003), but also unique requirements to encourage take-up and obligations to be inclusive. Referring back to the concerns about equitable access, the continuing fact of unequal access to the Internet is an obvious "demand-side barrier" to Internet use (Margetts & Dunleavy 2002).

There is a clear relationship between usability and take-up of services; a National Audit Office report (NAO 2002b) explicitly, although briefly, considers this relation: "*unless new services are easy to use and not complex there is a risk take up will be low*".

3.5 Policy and usability in e-government

As this chapter has shown, there is increasing awareness of the changing relationships between citizens and government, partly under the impact of e-enablement. Moving beyond an NPM-style minimal government, service provision is seen as a public good and as a tool for the achievement of policy objectives; a client-oriented rather than coercive approach is adopted to encourage behavioural change to support policy goals.

The research questions presented in section 1.2 make the assumption that usability and public policy are somehow linked. These chapters have justified this assumption by appeal to the existing literature. The case studies which follow will demonstrate these links in practice from analysis of the discourses of transport users and policy-makers.

3.5.1 Policy as experience

A few pieces of existing research have gone beyond an analysis of the usability issues to examine the underlying policy decisions which led to the problems at the interface, for example in the relatively simple link between policy and usability in the case of the Illinois ballot design (Design for Democracy 2002).

In an article which has a special relevance to this thesis, Thimbleby, Blandford, Cairns, Curzon, and Jones (2002) analysed problems with a transport ticketing machine, and suggest that many of these problems could be overcome by policy changes in the fare structure and in the excessive choices which the transport user is expected to make.

This line of thought raises the possibility that policy decisions, taken at all levels and all stages of design, have impacts on the user experience. A long-understood argument made by usability specialists is the importance of applying usability awareness early on in the design process rather than as an add-on (Chrusch 2000). Understanding this, Kossak Essmayr and Winiwarter (2001) apply standard HCI ideas to the design of a health insurance system in Austria; they demonstrate that issues such as organisational structure have an important impact on the functionality of the system.

In e-government applications, there is further need to consider the needs of the users from the very beginning; public services must reflect the legal rights to representation of the citizens and other stakeholders (Oppermann 2005).

However, what is missing is an analysis of usability in the complex, situated encounters of real life. As the "computer" and the "interface" become more invisible, more ubiquitous, and more engrained in prosaic actions, so an understanding of technology becomes more urgently an understanding of lived experience with technology.

3.5.2 Usability matters

The increasing penetration of computers into everyday life and the consequent complexity of experiences with technology imply, conversely, the need for a more elaborated concept of the ways in which usability impacts on the achievement of policy goals.

In a short introduction which raises awareness of the intersection of usability and public policy, Lazar, Johnson and Hochheiser (2005) point out that software tools to protect against viruses or to encourage responsible file-sharing are only acceptable if they are usable; these are policy issues because they support requirements enacted by law. Some well-known usability issues in e-voting systems have raised the crucial importance of usability in the public arena (Bailey 2000; Design for Democracy 2002; Usability Professionals Association 2006).

A conception of the user, or a model of relations between users and service providers or between citizens and government, which engenders an antagonistic experience threatens the achievement of policy outcomes. Recalling again Woolgar's (1991) concept of "configuring the user", Shields and Dervin suggest that in a similar way, policy actors "configure" or construct users as citizens or customers (Shields & Dervin 2005).

The need to emphasise positive experience becomes more central if, as suggested in section 3.2.4, the model is to be co-operation rather than coercion; user satisfaction is seen to be of public value in its own right, but also to encourage behavioural change on the part of service users. Incentivisation rather than antagonism is the aim where the relations between citizens and government are at least partly transformed in ways which place more onus on service users but also give them more direct control over transactions.

3.5.3 Transport policy and e-government

e-Government is distinguished from earlier forms of government information technology in that it is fundamentally about services for citizens (Margetts & Dunleavy 2002). But transport as such is not delivered electronically; the systems studied here are part of a complex interweaving of material and social objects, and, as such, offer a new perspective on relations between the material and the social.

Transport is not often considered as an application area for e-government, perhaps because of this imperviousness to full electronic service delivery; however, especially in an urban setting, it is a major area of public policy. Unlike some other policy areas, it affects not only citizens as such but everyone who travels in London, including visitors; but it does not impact all of them equally or in the same ways.

As a policy area, transport exemplifies the links between governance and service provision: an efficient and attractive transport system supports policy aims since it "*enhances business efficiency, ensures a wider spread of the fruits of economic prosperity and improves the quality of life of every Londoner*" (GLA 2001f). For cities in particular, transport is a major area of policy: as the GLA's transport strategy notes, "*traffic congestion and under-resourced public transport are regularly identified by the public and business as London's most pressing problems*" (GLA 2001f).

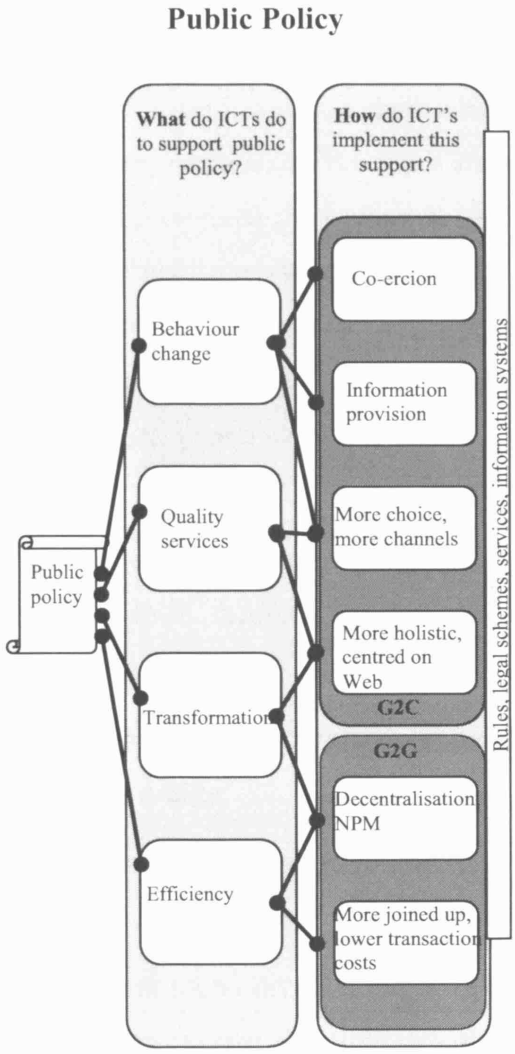
This thesis, then, addresses a key but often overlooked area of public policy, and suggests the part that information systems can play in supporting this policy area. It focuses on a close examination of the situated, contingent experiences of people who come into contact with these information systems. These lived experiences in turn hold lessons for those who design and implement policy. The conclusion of this chapter reviews these arguments and shows the need for research which follows this approach; there is not so much a lack of research in each domain as a need to join together several emerging strands from different domains.

3.6 Conclusions from the literature reviews

This review has considered how, in general, governments might seek to achieve policy aims, and the part that technology can play in this. This considered some ways in which, by extending or automating the "tools" of government (Bastow et al. 2000), policy aims might be achieved:

1. by encouraging behaviour change, through either extrinsic or intrinsic motivation, making use of information technology for enforcement but also through information provision and improved services (Christiansen & Nyvang 2005; Deci & Ryan 1987; Steg & Tertoolen 1999);
2. by improving services through quality, choice and satisfaction, leading to public value (Jones & Williams 2005; Kearns 2004; Kelly, Mulgan, and Muers 2002);
3. by enabling "transformed", re-engineered or re-invented government (Fulk & DeSanctis 1995; Hammer 1990; Heeks 1999), perhaps a New Public Management-style de-centralisation of government, or a post-NPM, more holistic "digital state" (Dunleavy & Margetts 2000); this means transformation not only within government, but between government and citizens;

4. by increasing efficiency within government through better procurement, more "joined-up government", or reduced transaction costs (Gershon 2004; NAO 2004).



Public policy design draws on e-government to achieve defined aims, through various mechanisms implemented with the support ICTs

Figure 8: ICTs in support of public policy

3.6.1 Achieving policy aims in practice ...

The specific ways in which technology might support these aims have been considered in this review in terms of e-enablement of public services. This thesis makes its contibutions by focussing on public services for the achievement of policy aims and as sources of public value (Kearns 2004); that is, public services have fundamentally political implications. Small, continuing changes can be as "transformational" as high-profile process re-engineering, but take place against the backdrop of large, national and global political movements; ambitious restructuring projects might capture the imagination of policy-makers and are themselves subject

to larger commercial and other forces (Grudin 2003). Too much of a "bottom up" viewpoint, therefore, could fail to see the unexamined assumptions on which these services rest and the dominant structures which they uphold, potentially marginalising and excluding some members of society (Beck 2002).

A particularly visible kind of transformation uses electronic access channels to enable the citizen to do for themselves what they would previously have relied on human intermediaries to do. Such changes again raise questions about the ways in which e-government might tend to emphasise control and to remove the possibility, for human public servants, of responding to daily contingencies. The suggestion that behavioural changes can be encouraged by either co-ercion or by better information and services (sections 3.1.1, 3.1.3, and 3.2.4) risks under-emphasising the power asymmetries which surround technology so that, even if technology "in itself" is "*neither good not bad*", nor is it "neutral" (Kranzberg 1995).

The other side to the argument is that policy decisions also have impacts, not only in this high-level theoretical sense, but quite directly on the lived experiences of citizens, and including insights developed in chapter 2, this raises the need to:

1. consider specific problems at the interface and in interactions at all stages of policy design;
2. take the artefacts seriously on the basis of an ecological analysis of affordances and the genre of border features;
3. promote a co-operative rather than confrontational, or controlling, relationship between citizens and government.

3.6.2 ... and in lived experience

The essential need, in investigating these questions around the case studies, is to understand usability not only at the level of the interface but in terms of the felt-life, in the emotional-volitional responses and desires of living people.

There is a welcome new recognition in HCI research and design that "*we experience the world in aesthetic, affective, and emotional terms*" (Winograd 1996:xix); and that, to use Winograd's metaphor, computers are not just devices with which a user interacts, but define a *space* in which a person *lives*.

This thesis places itself in this emerging tradition, but concentrates on research outside the *workplace*. This is more than simply a change of location; people encountering computers in their personal lives are encountering them with their bodies and with their own voluntary hopes and desires. It follows that there is a special need to understand interactions in their physical embodied-ness as well as in their emotional intent.

In extending beyond the workplace, placing usability in the context of lived experience, and proposing a carefully considered, nuanced understanding of the relations between society and technology, this thesis strengthens a growing body of research.

However, this research movement has not up to now been influential in e-government; although the significance of usability for e-government has been recognised, this has generally been at the basic level of the user interface. What is needed is to conjoin the realisation of the importance of usability in e-government as established in this chapter with the deeper understanding of lived experience developed in chapter 2, so that felt life in public services is moved from the margin to the centre of e-government research.

Without such an understanding, the details of the situated actions of users and the contingencies of daily life in experience will "*seem to float several feet above their human ground*" (Geertz 1986:374). This requires an approach to research which is open, avoiding preconceptions, without which "*one is working on a body of research which is pre-constituted, stopped, closed, and in a certain sense, dead*" (Rabinow & Sullivan 1987:12).

Chapter 4
Methodology

The introduction (chapter 1) and review of the literature (chapters 2 and 3) outlined the motivation and provided the background from the literature for the principal arguments of this thesis; this chapter breaks these down into the central research questions and contributions and describes the methodology which was used to address them.

HCI has been criticised as a "*magpie*" discipline (Blythe et al. 2006:137), superficial and "*bursting at the seams*" (Rogers 2004). But HCI is a new discipline, and necessarily gathers insights from other traditions; the challenge is to do so in a way which creates a new and coherent object, and which loses none of the depth of understanding of the disciplinary approaches on which it builds. The emerging theoretical perspectives on experience in HCI have been reviewed in chapter 2; the conceptual frameworks of, for example, Forlizzi and Ford (2000), McCarthy and Wright (2004) and Norman (2004) have many commonalities, but what is needed is an integration of theory, methodology, and practice (Blythe, Wright, McCarthy, & Bertelsen 2006).

McCarthy and Wright (2004; 2005b) have laid down important pointers to how this might be achieved, with their thoughtful case-studies; this chapter presents a methodology for bringing this line of research into relevance for public policy and, in future developments, into design practice.

4.1 The research questions

Recall the research questions:

1. In what ways do policy decisions, as part of the design of policy manifested in the developed systems and experienced by users, lead to positive and negative experiences in the lives of users of the systems?
2. Conversely, in what ways do positive and negative perceptions in the lived experiences of users of the system contribute to, or detract from, public policy objectives?

The basic claim is that usability is an issue for public policy: policy design has usability implications, and conversely usability problems contribute towards a negative reception of public policy by citizens while good usability contributes to citizen satisfaction with public policy.

The argument of this thesis is that policy-makers, in a social process which draws on the assumed capacities of technology and social factors, design policy in support of various larger policy aims. However, information systems implemented as part of this policy design may be experienced in the lives of citizens in ways which are not those intended or expected by policy makers; this has implications for the achievement of policy aims.

Conversely, the lived experience of citizens in response to public policy impacts on the achievement of policy aims. This goes beyond the rather simpler realisation, already familiar from the Florida 2000 "Butterfly Ballot" (Bailey 2000) and other examples, that poor usability in public services can have unexpected policy impacts. Subsection 3.2.6 considers that satisfaction and feelings of trust and fairness are important in their own right as souces of *public value* (Kearns 2004; Kelly, Mulgan, and Muers 2002). In turn, lived experience may also contribute towards wider outcomes, perhaps by:

1. promoting an antagonistic or, on the other hand, a co-operative relationship between government and citizens or service users; or
2. by dis-couraging or encouraging use of the services; or
3. in the ways in which the ecologies of the systems do, or do not, meet the mundane needs of service users.

4.1.1 Unpacking the research questions

Research Question 1 has really three parts, each of which sits on underlying assumptions which need to be considered here and which will form a framework for part of the research which follows:

1. How is public policy "designed" in the context of e-government?
2. How is it this design "manifested"?
3. How does this "lead to" usability issues and to experiences by users?

Section 3.4.1 has reviewed some existing ideas about the ways in which artefacts, more or less technologically sophisticated, can be said to have political consequences. It is useful to consider e-government technology on this rather physical level, since e-Government systems are built in response to political needs, yet are also physical artefacts with affordances as part of an ecology of artefacts and people.

As Winner has shown, artefacts in general *can* have political consequences, and, to borrow the vocabulary of the Actor-Network theorists, *can be* recruited as allies by policy-makers in support of their policies. In this sense, the design of policy "leads to" the design of systems, and so influences the usability of systems and at the same time is amenable to analysis by the methods of HCI. For example, just as the design of a highway bridge might (perhaps) be the implementation of a policy designed to prevent the passage of buses, so details of an interaction required of a user might be the more or less direct implementation of public policy decisions.

But this simple mechanism ignores the tensions between competing discourses through which policies, artefacts and systems are constructed. Policy is developed over time and in response to various pressures; yet this design is only fully achieved in the systems in us; it is also a mutual achievement of the users of the system,. The experiences of users arise from policy design, but not necessarily at the interfaces at which systems are encountered; the route from policy design to experience might be convoluted, and the experience itself might not be amenable to traditional HCI analysis.

The verb "manifest" is chosen to suggest the complex and often contested processes through which artefacts and systems are constructed as implementations of policy design; it is a provisional term, subject to revision on the basis of the findings.

It is possible to start to trace the path from policy design to experience on the basis of existing literature, as chapter 3 begins to do. In chapter 3, four main ways are identified through which technology is said to support policy aims; these, however, are not hermetic but may overlap and support one another. These are summarised in the conclusion to that chapter, section 3.6:

1. Through increased efficiency (section 3.4.3)
2. Through internal or external transformation (sections 3.2.1& 3.2.2)

3. Through quality services (sections 3.2.2 & 3.2.5)

4. Through encouraging behaviour change (sections 3.1.1 & 3.1.3)

Figure 9 below puts together the relations between public policy, technology, lived experience, and public policy outcomes, as they has been developed through the literature reviews. As section 1.2 outlined, the task is to answer the questions "*in what ways*" does design "lead to" manifestation, manifestation "lead to" lived experience, and lived experience "lead to" policy outcomes. The review has started to show how these questions might be answered in theoretical terms; this chapter presents the basis for throwing light on these questions empirically.

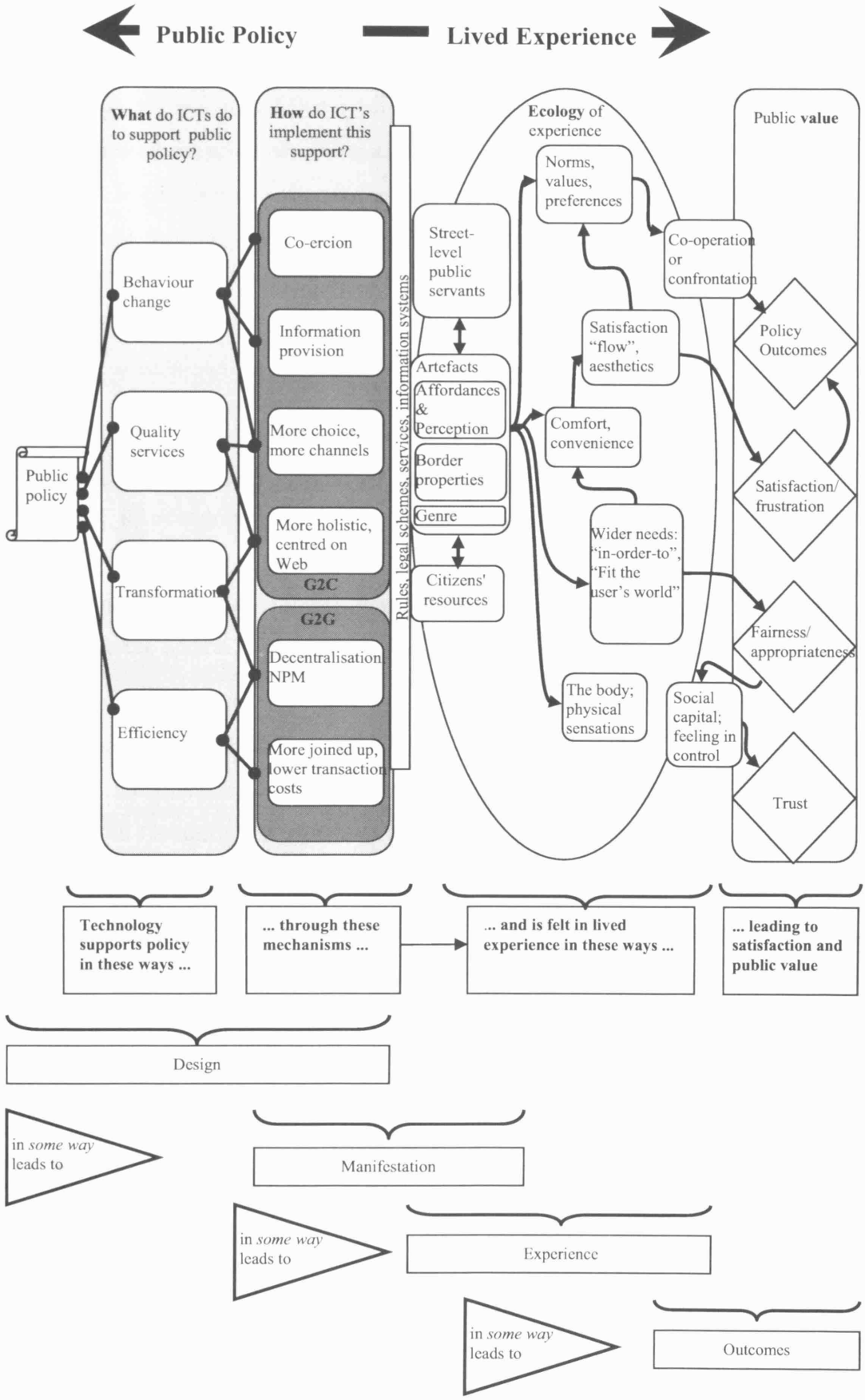


Figure 9: Complete theoretical understanding of public policy, implementation, lived experience, and policy outcomes

4.2 Understanding the lived experience

It has long been recognised that a "*scientistic*" view (Klein & Lyytinen 1985) cannot capture the full meaning of information systems in real use. Understandings which ignore the social context of communication fail to see the richness of interaction. For example, Markus (1994) and Ngwenyama and Lee (1997) have demonstrated the use of email to express *feelings* in rich ways using an apparently "lean" form of communication, whereas Boland (1991) found that readers of numeric data create "*a subjective reality of people with vibrant personalities*" from the "*cold, dead numbers*" (Boland 1991:453) on the page.

4.2.1 Making sense of technology

For those who encounter technology, making sense of experience is an active process of construction, *anticipating* the experience, *interpreting* and *reflecting* on it, and appropriating the experience as it changes to a greater or less extent the sense of self, and the person's memories and expectations.

Experiences are *recounted*, internally as part of the reflection on the experience, but also externally. Methodologically, it is through accounts such as these that experiences become accessible to research. However, recounting is more than this, since it is in recounting and perhaps hearing the accounts of others that meaning is formed.

This thesis takes the view that interactions with technology are experiences, and sets out to explore different aspects of these experiences across axes of the *physicality* of the interactions, their *meanings* for those who encounter them, and the *emotional qualities* engendered by these interactions. This investigation takes as its basis propositions which make three commitments:

1. That an interpretive approach, drawing on traditions which themselves are founded in phenomenology, is the most appropriate for understanding situated usability across these three axes.

This tradition in HCI research dates back at least to Suchman's (1987) consideration of the contrasts between pre-designed plans and situated action. Drawing on ethnomethodology, it regards information systems as resources rather than as programs determining action. This is "*situated*" research, in Avgerou and Madon's

(2004) terms, but not "narrowly situated", since the specific context is considered and elaborated. Its methodological resources are interviews, observations, and primary and secondary documentation, and its analytic tools are discourse and narrative analysis, Grounded Theory, and phenomenological reflexivity.

2. That interaction with technology is enabled and constrained by the artefacts of technology, and that these enablements and constraints have to be taken seriously but in a way which avoids essentialist assumptions.

The framework for analysis used here is based on the concept of affordances (Gibson 1977; Norman 1988) and of the genres of interfaces (Harré 2002). Understanding the genres and affordances of these systems draws on the same resources as that for situated action, but in addition a careful consideration of the artefacts themselves, based on the accounts of service users.

3. That usability issues in situated actions and detailed interactions at the material/social boundaries are experienced in the felt life of service users.

The assertions of the first two propositions need to be re-considered in the light of the emotional/volitional and sensual wholeness of lived experience.

A full understanding of lived experience has to take into account the humanity and feltness of real life. Dewey's (1934) pragmatist philosophy emphasises aesthetic and emotional qualities as inseparable from mundane life; experience is formed in "*the relationship between self and object*" (McCarthy & Wright 2004:17). Drawing on the dialogism of Bakhtin (1981), these relationships are recognised as complex, open-ended, and unfinalisable.

4.2.2 Methodological implications

A commitment to the significance of everyday occurrences and an avoidance of essentialism and universalist generalisations necessitates a research approach which is broad-based and searching (Klein & Lyytinen 1985; Wiggershaus 1986). Overcoming the "*great divide*" (Bannon 1997) between the social and technical sciences means not only that implementers of electronic systems have to be aware of the social aspects, but also that policy-makers have to be aware of the implementation, and the usability impacts, of policies as they are embodied electronically. This implies an approach which is open to the "*services of a variety*

of disciplines" (Bannon 1991), informed by the insights of each viewpoint to make a coherent contribution.

Studying e-government presents a number of specific challenges beyond those of conventional HCI, usability, or socio-technical research:

- the user is heterogeneous: all citizens are users of e-government in some form, even those who do not choose to access government services using electronic channels regularly;
- the users are numerous: in the case of urban transport specifically, it is precisely the need to process large volumes of transactions in near-real-time which drives some of the implementations studies here;
- in the case of transport, the users are transient: they are not undertaking complex cognitive tasks at fixed interfaces, but encountering systems as part of their journeys around the city. Although many of them are citizens, many are also visitors to the city, and unfamiliar with the transport system;
- the users are outside the workplace: as well as being heterogeneous, and so no assumptions can be made about their skill level or training; although they will build up knowledge as they make use of the system.

The interfaces, too, are multiple, varied, and ubiquitous. The problems of usability are not limited to the interface but to actions in which interfaces are encountered in passing, or not even encountered at all within the consciousness of the user; activity not so much *through* the interface (Bødker 1991) as *around* interfaces.

4.3 Phenomenological roots: mundane life as rich experience

In a typically phenomenological approach, *banal, daily occurrences*, such as travelling on the transport system, are considered as *rich* experiences. As van Manen puts it, "*the aim is to construct an animating, evocative description ... of human actions, behaviors, intentions, and experiences as we meet them in the lifeworld*" (van Manen 1990:19); that is, in the most mundane, familiar, and most self-evident experiences.

Unlike the positivist sciences, this study does not seek to generate and analyse measurable results in order to identify causal relationships of dependent on independent variables. This "positivist" epistemology is not confined to information

systems research; variants – in the form of neo-positivism and rational choice theory – are the mainstream in public policy research (Fischer 2003).

The aim, here, though, is to produce the kinds of "*thick descriptions*" (Geertz 1973) which cannot be captured from without, as with a camera; descriptions which can only come from entering as closely as possible to the way of seeing of those whose lives are the subject of research. In this thesis, these "anthropological subjects" are the users of e-government services in transport in London; and the wider aim is to uncover their experiences, and to relate these experiences to the public policies which define the systems with which they inter-act.

4.3.1 A case-study approach

A case-study approach enables an in-depth understanding from different perspectives. The interest in concrete, context-dependent practice, in the contingencies of daily life, and in the messiness of real experience, together with the belief, developed in section 2.1, that human behaviour cannot be reduced to rule-governed acts (Flyvbjerg 2006), strongly implies a case-study rather than an experimental approach.

Case studies are especially appropriate when, as here, existing areas of research are expanded in new ways so that there is an element of exploration of the issues. This is not to say that such research is not complete in its own right; *all* research builds on previous knowledge and in turn opens new questions for further research. Multi-case studies, such as this one, clearly provide a range of viewpoints. However, the cases have attributes in *common* as well as differences, and are chosen in the hope that understanding them will lead to better understanding beyond these cases.

While Yin's (1994) foundational case study methodology is generally considered to be a positivist approach, the approach taken here is interpretive, similar to the multi-methodology of Mingers (2003). Interviews are conducted not only with key staff in service provider organisations and with service users, but with advocacy and similar organisations working around transport in London. Press reports and unofficial bulletin board entries are analysed as well as official documents and meeting minutes.

It is sometimes suggested that case study research contains an inevitable bias towards confirmation of the researcher's preconceived ideas. Yet in the closeness to

the field which case-study research entails, preconceived assumptions and hypotheses are certain to be challenged (Flyvbjerg 2006).

The case studies which follow present some findings which are later drawn together as commonalities and emerging hypotheses. It cannot be stressed too strongly that these findings emerged from the data, rather than being merely confirmed by it. At the start of data collection, the only commitment was to try to understand how people relate to technology in general and in particular to e-government services and the policies which underlie them. The analysis in terms of affordances and genre, the felt-ness of people's encounters with technology, the building of detailed policies and their significance for the lived life of service users: all of these insights came later, *from* the data, rather than as input to it.

4.3.2 Taking the technology seriously: an ecological perspective

Both the making of meaning and the overcoming of "*normal, natural troubles*" rest on the basis of people's *physical* and *situated* interactions with artefacts as well as with other humans. In each of the case studies, the embodied-ness (Dourish 2001) of encounters with technology was analysed in terms of the *affordances* (Gibson 1977; Gibson 1979; 1988; 1999) and *genres* (Brown & Duguid 1994; Spinuzzi 1999; Spinuzzi 2003a) of artefacts and the systems of which they are a part.

These analyses concern the ways in which people perceive, make sense of, and then act on, the interfaces of many kinds with which they come into contact. As outlined in section 2.2.4, and as is developed in detail in each of the case studies, these are *ecological* analyses, concerned not simply with an artefact alone (a common focus of HCI design) but, more importantly, on the ways in which different artefacts work together as resources for action.

4.3.3 Grounded Theory

Grounded Theory is a phenomenological approach in the sense that the focus is on "*unravelling the threads of experience*" (Moustakas 1994:4). Grounded Theory offers "*both a methodology and a set of methods for building theory*" (Strauss & Corbin 1998a:14). Grounded Theory is widely used in Information Systems, for example, Orlikowski (1993) and Dedrick and West (2003), and specifically in HCI research into issues such as privacy, trust, and quality of service (Adams 2001;

Bouch & Sasse 2001) and in support of dialogical analysis (Wright & McCarthy 2003).

Grounded Theory, particularly in the form proposed by Strauss and Corbin (1998a), has come to be seen at *the* paradigmatic methodology for developing theory from qualitative data. In the sense that it guides the collection as well as the analysis of data, Grounded Theory is a unified methodology, in the collection of data as well as in the analytical stages of research.

However, there are practical and theoretical reasons to modify a Grounded Theory approach for the research undertaken in this thesis. On a theoretical level, it is necessary to question the "classic" claim of Grounded Theory that it is able to discover theory that "*really exists in the data*" (Dey 1999:17) for which the researcher is the passive translator. Assumptions of the realist ontology of Grounded Theory, however, have to be treated cautiously: in a book chapter, Strauss and Corbin have clarified their views, rejecting such a positivist view of theory as pre-existing "*out there*" (1998b:171).

As a practical method for understanding lived experience, classic Grounded Theory focuses on social factors as explanations for behaviour rather than on the lived experiences of people (Annells 2006; Dey 1999), and this suggests that its use is more appropriate when joined with other analytical methods.

4.3.4 Discourse and experience

A second level of textual analysis in this thesis is of the discourses of service users. There is increasing interest in research into discourse around information technology, as evidenced by an IFIP Working Group conference in December, 2002 (Wynn, Whitley, & Myers 2003). In HCI research, Discourse Analysis has been used to identify *interpretative repertoires* in users' descriptions of networked applications (Rimmer, Wakeman, Sheeran, & Sasse 1999), and from these to build lexicons as a resource for designers.

An interpretative repertoire, a concept developed by Potter and Wetherell (1987), is "*a culturally familiar and habitual line of argument comprised of recognizable themes, common places and tropes*" (Wetherell 1998:400). However, although this thesis identifies some *emerging* interpretative repertoires in the discourses of service

users, restricting analysis to this textual level would limit understanding to an impoverished, reductionist, framework (Fairclough 1992).

There are many different ways to do Discourse Analysis. It is not so much a method in itself as a collection of methods and associated theoretical underpinnings (Meyer 2001); it is "*between method and paradigm*" (Potter 2003). A common theme is that analysis goes beyond description: analysis should show in what ways the discourses are manifested in language, as well as their theoretical relevance (Antaki, Billig, Edwards, & Potter 2003).

For the interests of this thesis, perhaps the most compelling reason to draw on Discourse Analysis is to provide a rich, rigorous analysis of varied textual data (Light 2006) and in this way to uncover levels of *meaning*. In keeping with this epistemology, Discourse Analysis, or a discourse view in general, cannot produce broad empirical laws; it aims is to *elucidate* the functions of speech rather than to take them as unproblematic (Wetherell & Potter 1988).

Discourse Analysis considers discourse as a *topic* rather than a resource; rather than taking accounts at face value and thereby covering over inconsistencies to extract a "*definitive analysts' version of action and belief*" (Gilbert & Mulkay 1984:14), it accepts the variability and considers it as significant in itself.

There is, however, in this sense, a double analysis of the discourse in this thesis; it is a topic, but it is also a resource, in that what people say about the world is both a construction and a reflection of their experiences. Discourse Analysis does not focus exclusively on "*how and why language works*" (Gee 1999:8) in action, but can, and should, have relevance to "applied" areas; "*a discourse analysis must have a point*", as he argues (Gee 1999:8).

4.3.5 Understanding experience

Analyses of the technological systems as ecological constructs, the development of theory from data for which Grounded Theory is such a powerful (if theoretically uncertain) method, and the deeper insights offered by the various kinds of Discourse Analysis, are the underpinnings for understanding the richness of mundane experience. In ethnomethodological terms, the "*familiar scenes of everyday affairs*" (Garfinkel 1967:35) are the most central interest; Garfinkel acknowledged his debt

to phenomenology in the person of Schutz (1972), and this thesis is based on an essentially phenomenological perspective.

But, following the discussion in section 2.4, the conception of experience and of interaction with technology taken here is informed by a realisation that these interactions are *dialogues*, in Bakhtin's sense; they are relations between self and "other". This perspective on experience is further deepened by the pragmatist philosophy of Dewey, developed as an interest in HCI by McCarthy and Wright (2004). Although, as McCarthy and Wright aver, these are two philosophies which are not often considered together, their approach makes a coherent whole. It is united by a concern for the *felt-life* which is to be found in "*the ordinary and everyday and, in many ways, the practical*" (McCarthy & Wright 2004:185); in the emotional and aesthetic potential of life as understood by Dewey, and in the emotional-volitional commitment to the *event-ness* of being which is at the heart of Bakhtin's a-systematic philosophy.

4.4 From methodology to method: what was done

As the previous section has made clear, the methodology in this thesis was designed to enhance the understanding of lived experiences arising from usability in context and from the specificity of interactions with e-government systems. The three case studies, joined by a common thread of urban transport, actualise this in the daily lives of service users. This section outlines these studies and describes the rationale for their selection.

4.4.1 One policy area: transport. One city: London. Three case studies in e-government

A distinction is sometimes made between in-depth case study and ethnography (Myers 1997); this is a case-study approach in the sense that the primary sources of data are interviews, documents, and to a lesser extent artefacts and observations, rather than extended participant observation.

Transport for London's e-government strategy (TfL 2004j), set out in April 2004, defines the cases studied here as the three key e-government initiatives:

- electronic ticketing in the form of the Oystercard;
- support for the Central London Congestion Charge (CLCC); and
- the TfL Journey Planner across several channels.

The "Countdown" real-time bus information system, another key initiative, would have made an appropriate focus of study, but it is now over ten years old and is currently being upgraded (TfL 2004j).

Between them, the implementations studied here aim to *encourage* public transport use by reducing "barriers" to transport in terms of obtaining and using tickets, improving services by reducing delays on buses and in other ways, and assisting service users to make transport choices based on accurate, real-time, cross-mode information. These implementations also aim to *discourage* non-sustainable transport choices through financial dis-incentives.

4.4.2 Contrasting the case studies

In terms of the centrality of information systems in each case study, Oyster is a good example of a basic service maintained across the introduction of electronic technology. Contrasting with this, the Central London Congestion Charge is an example of a policy which would have been extremely difficult to implement without complex and inter-related electronic systems. Finally the Journey Planner and related information provision is an example of new applications which are enabled by electronic information systems.

These cases are therefore all "Digital Economy", rather than "Information Economy", in the terms used by Kling and Lamb (1999): that is, they are critically dependent on digital technologies for at least some aspects of service development or provision, but are not in themselves informational goods or services (compared with, for example, publishing or legal services).

An early investigative study on the Oystercard grew into a large case study, and this led to the awareness, through reading GLA strategy documents, of the lack of consideration of transport in e-government terms, despite the central importance of transport in the urban setting. A focus on transport also makes a rounded and coherent contribution in one important application area.

Case:	Interfaces are:	Application is:	Users relate:
Oyster	Hidden/opaque transitory multiple non-traditional; eg. RFID	Electronic extension of basic service (payment for transport use/fares)	Service use is strongly encouraged Service offers new options for users and providers
CLCC	visible/hidden (ANPR cameras) situated or mobile multiple traditional (paper, personal, phone) and electronic	service which could not be *scaled* to large city without use of electronics	Service use is mandatory, if vehicle has been used in the zone/times
TfL Journey Planner	Visible focus of users' attention one predominates: mainly website	wholly electronic service	Service use is optional and ties with other information sources

Table 3: Contrasting the case studies

4.4.3 Caveat and justification of approach

This thesis relies heavily on retrospective accounts, both in terms of interviews and focus groups with service users and of documentation.

It is in retrospect that experience takes on meaning, but at the same time loses something of its living concreteness (Schutz 1972; Walsh 1967). This is a well-rehearsed topic in qualitative interviewing: experiences are "*constructed or reconstructed*" (Mason 2002:64) in interviews, rather than being a reflection of understandings which "already exist" outside the interview *situation*. Details of the actual interaction are lost: Suchman (1987) and the social constructionists, on this basis, make a critique of retrospective interviews.

On the other hand, unlike "naturally-occurring" data, "*interviews have the virtue of allowing the researcher room for active intervention*" (Potter & Wetherell 1987:163). In this sense, it is not the case that "external reality" is unaltered by the researcher, but the interview aims, rather, to provide a coherent view of that reality. For this reason, interviews were transcribed in full, including the questioner's interventions, since these are also part of the reality of the interview.

There are strong methodological considerations which justify the use of retrospective accounts in this research:

- the relationship between accounts and "reality" is problematised in the analysis; the accounts themselves are a topic of study in their own right, as discourse; and
- it is in any case fallacious to see observations as truly naturally-occurring, since there is a balance to be struck between observations in as natural a situation as possible and the possibilities for recording.

It was not possible to bring elements of the Oystercard system into a laboratory, nor to reproduce the many situations in which the CLCC systems are encountered. In the case of the Journey Planner, it was possible to create a reasonably natural environment, and hence to use recordings as well as paper and pencil observations.

4.5 Data

Linguistic data, generated from interviews and focus groups, in addition to policy and other documents, forms the backbone of the data. These are supplemented by observations, interviews with key staff, and symbolic artefacts such as maps, advertisements, the Oystercard itself. Collectively, this forms a rich dataset: a true case-study approach (Yin 1994).

Other strands of discourse are also, however, of interest: oppositional discourses, discourses of politicians both in favour and against (the structure of the GLA and London mayor does not neatly fit into "government" and "opposition", the GLA being essentially a scrutinising chamber for the mayor), and media discourses, especially the local London press.

4.5.1 Research interviews and focus groups

The aim of the individual in-depth interviews and focus groups with service users was to encapsulate their experiences with and around the e-government systems.

Within the constraints of a research interview or focus group, the interviews were informal and conversational, and as open as possible, avoiding expectations that interviewees' contributions will fit into the "*conventional categories*" (Bruner 1990:115; Mishler 1986). The interviewer or moderator had a list of topics to be covered, but these were a guide rather than dictating the order of the questions. Focus groups were rather different from individual interviews in this respect,

because they were designed to resemble more natural discussions in which participants interact with one another, as well as with the researcher (Lunt & Livingstone 1996).

Interviews were carefully designed to draw out *accounts*; the "meanings" which users have attached to their experiences, in Schutz' (1972) terms, and the *achievement* of meaning as narratives: taking seriously what people say and "*what they say they do and what they say caused them to do what they did*" (Bruner 1990:16).

Interviews and focus groups are ethnographic, in this sense, rather like the deep explorations of experiences of small numbers of individuals done by Blythe et. al (2006); indeed, some participants took part in all three of the case studies, and peoples' orientation towards transport, particularly in London, and the transport policies of TfL were part of the background to the interviews.

Narratives are also clues to cognition Forlizzi and Ford (2000). However, narrative is not simply a stage between sub-consciousness and cognition; experiences are the basis for narrative construction, so that good experiences provide affordances for constructing satisfying narratives (Laurel 1993; Laurel 2004).

4.5.2 Interviews with key staff

Another important source of data was interviews with key informants (sometimes called in public policy research *élite interviews*, although these are not overtly political interviews) and staff with specific roles in Transport for London and related organisations. There were four reasons for undertaking these interviews:

- to strengthen the research by raising issues with authoritative speakers involved in service design and implementation;
- to give the organisation an opportunity to respond;
- to understand the intentions of the service providers, beyond what is explicit in published documents; and
- to add to the knowledge of future plans for the services.

For both practical and epistemological reasons, interviews with TfL staff were not subjected to the same level of discourse analysis as interviews with service users. The practical reason is that it was not always possible or ethical to voice-record interviews with senior staff. The epistemological reason is that this is not public

discourse in the same way as the discourses of service users, and the discourses of policy-makers expressed in public policy documents, minutes of meetings, and other public spaces.

A second kind of élite interview was with representatives of advocacy organisations, such as those which collectively represent groups of transport users or other interests or have taken a specific stance with regard to these issues. These additional interviews:

- drew on the wider experiences of client groups;
- engaged with key participants in debates around transport issues; and
- raised new perspectives on the questions of interest to this thesis.

4.5.3 Documentary texts

Since the aim is to investigate the inter-relations of public policy and the lived experience, the "other side" is represented, as well as by interviews with informants in TfL and the GLA, by publicly available documentary texts. These consist of:

- Minutes of meetings of the GLA and TfL
- Strategy documents - the GLA Transport strategy and related policy documents
- Reports into feasibility and the impacts of policy options
- Acts of parliament and legal orders from the GLA
- Official websites
- Information leaflets
- Press releases from the GLA and TfL
- Documentation from other sources, press reports, and documents from advocacy organisations such as the London Transport Users' Committee (London TravelWatch).

It is important to stress that these documents were key to the development of the understandings developed here, and not only used as background to the interviews, or as validation of other data (Atkinson & Coffey 1997). Because of their heterogeneous nature and in keeping with the interests of this thesis, these documents were interpreted in terms of policy decisions affecting the lived experiences of transport users in London rather than subject to full discourse

analysis in the same way as the interviews. However, this is not a reflection of any lower importance attached to them.

4.5.4 Observations

Observations formed a relatively small part of the data but were nevertheless significant as "naturally occurring" data. Field observations were done in Underground stations at very busy times as part of the Oyster and the Journey Planner case studies.

One of the case studies, the Journey Planner, also involved a task-based observation in a usability laboratory of use of the web-based JP interface.

Station observations were also an opportunity for informal interviews with station staff (note that service users were not interviewed during these observations). Because it was not possible to voice-record these interviews, they were not subjected to Discourse Analysis in the same way. However, by raising some common issues which are handled by staff on a routine basis, they add an important wider dimension to the in-depth interviews with service users.

Case:	**Service users**	**Documentation**	**Other data**
Oyster	In-depth: 6M 5F Focus groups: 8M 7F in 4 groups	32 Documents. Artefacts: the Oystercard, posters and websites promoting the card, ticket gates, touch points at DLR stations	14 interviews with specialist staff 1 GLA member 1 political party policy officer 2 researchers at advocacy groups 1 TU officer Observation at Underground station: Green Park
CLCC	Standard interview: 32M 20F In-depth: 9M 5F	62 Documents Artefacts: 2 CC-related websites	3 interviews with specialist staff 2 interviews with originators of campaigning websites 1 TU officer 1 Fleet manager 3 Advocacy groups

Case:	Service users	Documentation	Other data
Journey Planner	11 observation participants: 3M 8F 19 in-depth individual interviews: 14M 5F Focus groups: 4M 11F in 4 groups	12 Documents Artefacts: JP Website, maps on website and elsewhere, information at bus stops and stations	1 TfL Group marketing officer 1 Travel Information Centre Manager Observation at Underground station: Victoria

Table 4: Data sources for the case studies

4.5.5 Sampling and recruitment of research subjects

Interviewees were recruited using a number of methods, according to the availability of time and resources. The aim was, without any claim to randomness, to sample as wide a variety of service users, with varied experiences, as possible.

- For the Oyster study, initially a request was made to contacts including students on one MSc course at UCL. This was supplemented by informants recruited by email mail-shots, leafletting of students enrolling for discounts, and personal contacts. For this study, interviewees were unpaid volunteers;
- for the Central London Congestion Charge research, a larger sample of interviewees was recruited by students as part of a final-year design project, as well as more in-depth interviews;
- for the Journey Planner observation and focus groups, a research database of some 3000 entries of potential research subjects was also used; invitations to participants were emailed to every tenth entry (from a random starting-point) in the database. In this case, interviewees and observation participants were paid £10.

Contacts of contacts ("snowball sampling") were used to some extent, to produce a more varied sample than internal recruitment methods. This also allowed for some theoretical sampling; for example, neighbours who live close to one another and within a short distance of the edge of the congestion charging zone were interviewed as a cohort.

Interviews and focus groups lasted at most one hour (the longest was seventy minutes); this is shorter than is typical for focus groups, but it was felt that longer

than this is likely to make too great a demand on participants and to lose focus of the interviews.

4.6 Analysing the data around the research interests

In chapter 2, the concept of the *lived experience* was introduced, and it was suggested that a phenomenological viewpoint, drawing on an understanding of a dialogical relationship, could help to understand this. In this section, this will be related to the methodology and in particular to the analysis of the data.

4.6.1 Transcription and Coding

All of the interviews and focus groups were fully transcribed from voice recordings. Transcription is not in itself analysis (Antaki et al. 2003), yet the transcription process inevitably draws on theoretical understandings and in this sense starts to impose an interpretation on the raw speech (Fairclough 1992). The point is not to avoid this interpretation, but to be aware of it, particularly when considering appropriate transcription conventions. In this research, a relatively simple transcription format was used which did not attempt to show all emphases or rising and falling intonation, but did indicate pauses, speaking together, and small interruptions.

Coding of the data from interviews and focus groups proceeded along a number of axes. At the most basic, it consisted of indexing occurrences of particular items of interest (for example, the variety of channels people use to pay the Central London Congestion Charge). These are not simply descriptive but are the start of *narratives* which may be qualified in various ways (why do they use these channels, is there a variety, how do they express their frequency of payment, and so on).

Following the research interests discussed above, this then provides the basis for *iterative coding*. That is, repeatedly looking through and refining analysis of the discourses of service users. Specific areas of interest were narratives, the rationalisations and stories in the text; interdiscourses of service users drawing on "other voices"; and dialogues, making of meaning in dialogue and interaction with artefacts.

Details of the coding frames are in the appendices. Wherever possible, interview transcripts and codings were checked with participants. Even when this was not

possible, the voice-recorded interviews provide a good reference record, and digitisation makes these readily available for analysis.

In terms of process, the qualitative analysis software Atlas TI (Scientific Software Development 2005; Scientific Software Development 2006) was used to code the data around these emerging codes; in an iterative process, codings were reviewed at several stages. As a technical detail, code tidying became much easier with the availability of Atlas TI Version 5, which has a better code merging feature than that in Version 4.

4.6.2 Grounded Theory

Following the critique made in section 4.3.3 above, Grounded Theory was used only to a certain point in the analysis, and in support of other analyses. The openness of the research question, as in these studies, is fundamental to the Grounded Theory methodology. Open coding, followed by the assignment of codes around concepts (axial coding), and iteratively comparing developing theory to the data were similarly drawn from classic Grounded Theory. Other aspects, particularly as proposed by Strauss and Corbin's (1998a) widely-used methodology, were avoided: notably, the conditional matrix and the paradigm model. In this, the analysis is arguably closer to the spirit of the original Glaser and Strauss (1967) approach, with it emphasis on the *fit* of theory, without "*forcing*" (Glaser 1992).

An important and valuable Grounded Theory contribution is the concept of *theoretical sampling*: collecting more data in support of emerging theoretical understanding, ideally to *saturation*; however, this was possible to only a limited extent in these cases.

Taking a critical approach, avoiding face-value interpretations of the texts of interviews and focus groups, the coded data was further analysed using Discourse Analysis, as the next sub-section describes.

4.6.3 Dialogue and discourse analysis

In *interviews and focus groups with service users*, and with people who represent either organisations speaking for groups of service users, or individuals who have taken a public view of a service, the interest was in questions such as:

- How do users make meaning in their interactions with services?

- What are the "other voices" on which users call in understanding and accounting for their use of services?
- On the basis of this meaning, how do they follow procedures, and how do they deal with "*normal, natural troubles*"?

From a dialogical point of view, "*normal, natural troubles*" are not simply "things that happen", but a form of dialogue between service users and service providers; users are not only readers and but also *co-constructers* of meaning (Wright & McCarthy 2003). Or, to put it in Bakhtin's terms, the simple concept of the *listener who perceives* as the "passive" partner in a transaction is a fiction: listening is an active, responsive attitude (Bakhtin 1986).

Other Discourse Analysis concepts were influential as models: Davies and Harré's (1990) concept of "positioning" to help to understand the ways in which people construct themselves through discursive practices in ways which are sometimes discontinuous and contradictory; Hopkinson's (2003) analysis of "high-tension" and "low-tension" narratives.

In these ways, these interests illuminate the first part of the research question, because they show, from the discourses of service users, how technology implemented in support of policy is experienced in their daily lives. This also addresses the second side to the research question, because it suggests how, on the basis of the *dialogue* of ordinary citizens with this technology, these lived experiences of technology impact on the achievement of policy objectives.

In parallel, the other major strand of data, the *public discourses of policy makers* in documents and minutes of meetings, was analysed around the research interests in terms of:

- What are the assertions made by the public discourses, what are their underlying assumptions?;
- what do these say explicitly about concern for the lived experiences of service users?; and
- what are the implications for lived experience?

4.6.4 Theory building

Although working "up" from data to allow theory to "emerge" is presented as the ideal in Grounded Theory, in this research, centred on understanding lived

experience, it was felt necessary to keep the research questions in mind and to draw on prior theoretical input, working "down" from these theoretical interests (Richards & Richards 1998) as well as "up" from the data; constructing as well as discovering theory (Dey 1999). Thus, theory, data collection, and analysis were developed together in what Mason (2002:180) has called a "*dialectical process*". Details of the workings of these analyses can be found in the appendices.

A stage in the building of theory was an analysis of the construction of *interpretative repertoires* as discussed in section 4.3.4 above; but with these technologies which are developing, bringing into question "*the open and uncharted aspects*" (Cornford 2003:2) not only of emerging technology but of the ways it is being adopted and experienced in peoples' lives, these repertoires are not stable, but are emerging (and will continue to emerge).

For this reason, this analysis is hesitant about identifying particular discursive practices as established repertoires. In addition, while coding identified recurrent themes, not all themes can be said to fit within interpretive repertoires; analysis across texts was based around these themes, not only for interpretative repertoires but for positioning and meaning-making in discourse.

4.7 Empirical validity

"*Validity represents the ... claim a text makes for its own authority*" (Lincoln & Denzin 1998:415). The difficulties of basing findings on a collection of inevitably individual "*knowing subjects*", of classification (Prior 1997), of positioning the researcher either inside or outside the research field, and of attempting to locate an untenable "*bedrock objectivity*" (Altheide & Johnson 1998:309), lead to questions about how to assess good research, and have reasonable confidence in the solid findings; this is so, whether or not it addressed openly, for all kinds of research, quantitative as well as qualitative.

In common with discursive researchers, this thesis claims its validity on the basis of clarity and openness in argument, along the lines of what Altheide and Johnson (1998) suggest as *validity-as-reflexive-accounting*; clarity in particular in the relationship between what is observed (or recounted) and its contexts, between the observer and observed, and relation between accounts and experiences. Particular

issues of validity for case study, interpretive, and Discourse Analysis research are considered in the sub-sections which follow.

4.7.1 Quantity of data and saturation

In Grounded Theory, there is a concept of *theoretical saturation*, beyond which no further theoretical ideas are being found. Since in Grounded Theory, data collection is done alongside analysis and emerging theory, at this point both collection and first-order analysis can stop (Glaser & Strauss 1967).

In contrast, the in-depth description which is the aim of phenomenological research in general limits the number of participants in a study; Rathswohl (1991) for example suggests less than ten as a typical sample size, provided the informants can give reliable information on the phenomenon being researched. The cases here used somewhat larger numbers than this, as well as other forms of data.

In a Discourse Analysis approach, there is no concept of saturation as such; on the contrary, there are in principle always further insights to be found. There are only so many stories to be told (Lunt & Livingstone 1996), but every interview and focus group will add more nuances.

However, the point is to consider how much data is *enough*; in practice, for resource reasons it was not always possible to continue until no further issues arise. Recognising this, the claim in this thesis is not that all possible issues have been identified, but that this research analyses the major issues and places them in the experiences of a reasonably representative sample of service users.

4.7.2 Commonalities

Using several case studies, as this research does, allows for *cross-case analysis* (Yin 2003) following a *replication logic;* that is, the cases have something in common (as well as significant differences) in terms of *outcomes;* replications in findings give more confidence in the overall results.

It is important to raise here some concerns about the popular idea of *triangulation.* In qualitative research, Mason (2002), for example, points out that different forms of data are likely to throw light on *different* social or ontological phenomena, and therefore looking for common findings in this different data, as a form of triangulation, is likely to lead only to confusion.

Similarly, analysis of different discourses is likely to identify differences as much as similarities; rather than attempt resolve this variation, the approach taken by discourse analysts, and in this thesis, is to accept the *differences* between discourses, as a way of understanding the planning rationale of the service designers and the discursive constructions of service users.

4.7.3 Validity in Discourse Analysis

In keeping with the Discourse Analysis methodology, the claim is not to have uncovered an external reality, but to have interpreted the data in a convergent and clearly meaningful way (Gee 1999). Potter and Weatherell (1987) suggest four techniques for validation of Discourse Analysis: 1. coherence; 2. participants' orientation; 3. identification of new problems and solutions to them; and 4. fruitfulness. In terms of *coherence*, they suggest that as well as providing coherence to a body of discourse, analytic claims should look to *exceptions* as providing further *confirmation*; exceptions which clearly have some special features which mark them off and explain the exception, far from refuting the findings, serve to extend and strengthen the analysis. Anchoring validity in participants' orientation is a way of saying that the claims are supported by detailed evidence from the texts (Potter 2004).

The most powerful criterion of validity is said to be *fruitfulness*, a criterion which has something in common with validity in scientific explanations: can the analytic scheme be used to make sense of new kinds of discourse, to generate new explanations?

These criteria are revisited in the final chapter to demonstrate in what ways they have been fulfilled in this research.

4.7.4 Generalisability and replicability

The use of multiple case studies might be thought to increase the generalisability of the emerging theory by allowing the theories to be examined from a number of different viewpoints. In case study methodology, generalisation is to *theory* rather than to *populations* (Yin 1994); the cases are not claimed to be a representative sample of a population.

A case study can serve as *"concrete, particular"* illustrations of people's relationships with technology (McCarthy & Wright 2004:128); in this sense, cases

perform an illuminating role, even if they do not "prove" or even explain anything (Walsham 1993). A case-study approach involves unique and therefore non-replicable events (Lee 1989); however, in the cases studied here, the data in the form of recordings, documentation, interview transcripts, and notes of observations is available for re-analysis.

4.8 Chapter summary

This chapter has presented a methodology which actualises a way to understand the lived experiences of service users and to link these experiences to specific policy designs. This methodology takes analytic techniques from different disciplines, which are built to a consistent, coherent whole.

The commitments to an interpretive approach and to taking seriously the artefacts of technology lead to perhaps the most important commitment, to understanding interactions in *felt life*. This is a fundamentally phenomenological approach, but from the pragmatism of Dewey comes a realisation of the inseparability of ends and means and of the aesthetic quality of mundane life. The dialogism of Bakhtin emphasises relationships between humans and technology as open and unfinalisable processes in which both are implicated.

Putting this into action, three case studies are presented which contrast along the dimensions of the *kinds of interfaces*, the *implications of technology* for the application, and the *ways in which users relate* to the system. Data for these studies is similarly heterogeneous, but the most central data source for all three consists of in-depth, mostly semi-structured, interviews and focus groups with cross-sections of ordinary service users.

The collection and analysis of this central data is based on two methods, Grounded Theory and Discourse Analysis, which support the fundamental phenomenology of the approach. Both methods offer rich insights but both have shortcomings, and are freely drawn on in a combination for which the essential aim is to discover meaning of experiences through accounts given by service users.

PART II: THREE CASE STUDIES OF E-GOVERNMENT SYSTEMS IN URBAN TRANSPORT

Chapter 5

Case study 1: The TfL Oyster smart card

Since the earliest days of mass public transport, there has been a requirement for revenue collection and consequently to ensure payment of fares, and this is generally done by the simple means of issuing value tokens or *tickets*. At first, tickets were hand-written as needed, but gradually pre-printed value stock was introduced (Field & Agnew 1996).

On the London Underground, pre-printed tickets with a single value were too labour-intensive and too inflexible to support innovative fare policies, and thus in turn were replaced by tickets printed at the point of sale. Magnetically encoded tickets, in use since 1966, allow for better monitoring of journey patterns and reduce opportunities for fraud.

The changing nature of the ticket has been paralleled by changes in the ways tickets are sold: greater automation in the ticket-office, and, starting in 1904, greater use of passenger-operated ticket machines. In some cities (Washington, D. C. and Hong Kong), magnetic encoding has also been used for stored value (Field & Agnew 1996), obviating the need for individual ticket sales.

The Oyster transport smartcard is a product of the history of fare-collection needs and changing fare policies in London, from the allocation of fares across separate companies to continuing integration under Transport for London. It is also a continuation of the historical trend towards automation, with less reliance on ticket-office staff and more on self-service by the traveller, and of the emergence in urban transport of smartcards for ticketing and other applications.

5.1 Research perspectives of this case study

The Oystercard contrasts with the other two case studies presented in this thesis in that it represents the intervention of electronic information systems into a traditional application area: control of revenue and the issuing of tickets to the travelling public. As such, it is an example of the mundane, daily activities through which people encounter computers in their routine lives, usually in passing and peripherally to their central experience and volition; web-based screen and keyboard interactions are a minor part of the user interface in this study.

The Oyster system provides a privileged viewpoint from which to understand the affordances of electronic systems, and to analyse the ecologies of systems in the lived experiences of service users. Oyster is an encompassing mixture of perceptible and hidden affordances, of affordances which require simple mediation and those which require learning, or what Gaver (1991) calls *exploration* of the possibilities for action.

5.1.1 Background to the TfL Oyster smartcard

The TfL Oystercard is part of the *Prestige* project to upgrade ticketing on Underground and buses. This project is being delivered by the specially-established *TranSys* consortium; it is said to be the largest Private Finance Initiative project in the UK, at £1.2billion over 17 years from 1998 (Whicher 2004). The project includes ticket gates and revenue infrastructure as well as the Oyster smartcard itself.

Amongst other properties, a "smart" card:

- is quicker, easier, and more reliable than magnetic encoding;
- does not need to be removed from the user's wallet;
- remains in the customer's view throughout – a consideration with high-value season tickets (Field & Agnew 1996);
- makes new ticketing options possible such as the ability to mix a season ticket with pre-paid value on a single card;
- enables options such capping of daily fares;
- and offers the potential for new fare options: peak/off-peak, or even directional fares (LTUC 2004).

This recalls a much earlier example of the simple technical possibilities of different ways of collecting fares: the few graduations of US coinage favoured a flat 5¢ fare, whereas the more closely-graduated British coinage enabled a wider range of fares on urban transport (Bond 2003).

As well as the Oystercard, some pioneering London boroughs have produced smartcards which combine council services, such as library use, with transport; the idea is to make use of the smartcard as easy and transparent as possible, by using a card that is already in peoples' pockets (London Borough of Croydon 2004; TfL 2004d).

Smartcards are generally more reliable than conventional tickets (Guglielminetti, Buri, Tzieropoulos, & Garcia 2000); some are truly contactless, but the Oystercard requires close proximity ("touch in/touch out") with the reader.

Smartcards, and some magnetic stripe cards (for example, first-generation Octopus used in Hong Kong), can also store value. Oyster is multi-function in this sense, capable of storing not only season tickets and pre-paid value ("Pay-as-you-go"), but potentially other products such as event tickets. However, Oyster does not currently conform to the emerging national Integrated Transport Smartcard Organisation (ITSO) open standard (ITSO 2004); Oyster readers cannot read ITSO standard cards and vice versa. This incompatibility presents difficulties in the use of Oyster on trains. It has arisen largely because, when the smartcard ticketing contract was awarded in 1998, ITSO was not developed, and is still not mature (House of Commons Transport Committee 2006).

5.1.2 Phased introduction of the Oystercard

London Underground ticket outlets started to switch to the Oystercard in the autumn of 2003, following trial use by TfL staff. The card was introduced in phases; period tickets were transferred to Oyster first, and since January 2004, Oystercards have been available for storage of "Pay-as-you-go" [1] value. Pay-as-you-go provides a saving as well as an added convenience, although, until the "Daily Cap" fares was introduced (end of February, 2005[2]), it was possible for several trips in one day bought using Oyster to add up to more than the cost of the existing daily Travelcard.

According to the most recent available figures[3], there are 2.5 million Oyster users and 3.9 million journeys a day using it (TfL 2006a).

For the student of the inter-relationship between policy and user experience, the story of the development of the Oystercard raises issues about the ways in which technologies are perceived by policy-makers as enabling new policy options. This chapter takes a viewpoint from the affordances of Oyster in the lived experiences of service users, and so avoids essentialist assumptions about the properties of

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[1] Originally introduced under the name "Prepay", this is now known by TfL as "Pay as you go"; however, since most of the data gathering for this research was done while the earlier term was still in use, and it is used throughout the interviews and documents, it is retained in quotations

[2] This is after most of the primary interviews in this research

[3] March, 2006

technological systems. Together with an analysis of the ways that policy around the Oystercard is made, this throws new light on the capabilities which technology offers to the policy-maker.

5.1.3 The case study

The data included one-to-one interviews with 14 early users of the Oyster smartcard, and four focus groups including a focus group specifically on the question of mixing cycling with public transport, interviews with key staff, and analysis of over 30 documents.

The interviews with service users followed a semi-structured form with a standard set of questions; similarly, the focus groups were moderated around a set of basic questions. This open schedule allowed for investigation of interesting issues raised in the course of interviews.

Interviews with fourteen senior managers in TfL and other organisations, including local authorities, and with politicians and policy-makers, served both to corroborate findings and to open up new avenues of questioning.

Finally, observation-based field research at an Underground station using paper-and-pencil note-taking was the opportunity to interact with front-line station staff and to observe transport users making routine use of the Oystercards, ticket machines, and gates.

Data was collected between February and December, 2004. These data sources are detailed in Appendix C.

5.1.4 Data analysis

As for the other case studies, Discourse Analysis consisted of a number of stages: Grounded Theory-style open coding, followed by gathering of the codes into families, analysis of the families around both emergent *interpretative repertoires* (Potter & Wetherell 1987), and *themes*, recurrent stories; these codings are attached in Appendix C.

A study of the meaning-making in key *narratives* told by service users (Bruner 1990; Bruner 1991), including intertextuality, interdiscourse and *reports* of stories on behalf of others (Wetherell 1998) formed a second-level analysis.

Analysis therefore focused on the following interleaved layers:

- border features, in Brown and Duguid's (Brown & Duguid 1994) sense, the often unconsidered properties of objects at their borders and as boundary objects. Actually one of three codes grouped by prefix: see "Code groups" in Appendix C.2.ii;
- policy issues, such as fare structure. As four code "families": see "themes gathers into families in Appendix C.2.ii;
- enchantment and values, especially privacy. As a code grouped by prefix;
- two transport modes in particular: bus and train. As one of the code "families", and also as "contingencies of lived life"

The discourses were analysed in depth around a small number of significant themes relating to aspects of the affordance ecology. A full list of the raw themes is in Appendix C. The themes selected for detailed analysis were:

- Renewing tickets or Pay-as-you-go online, (part of "Hackney problem" and "contingencies of lived life" in Appendix C.2.ii) which requires the user to pass through a station. This has clear implications for those who travel mainly by other transport modes, but even for Underground travellers, the delay between ordering and collecting tickets reduces the usability of "off-system" sales;
- "touch in/touch out": there are border features of the gates which enhance or detract from users' experience with the card, particularly for Pay-as-you-go users. There are some wider, policy-related issues with the need to "touch in and touch out": sometimes the reader is broken, the gate is open, or card readers are unavailable on overground services;
- the Daily Cap: that is, when the total fares reach a certain limit, no further fares are charged that day within those same zones and modes.

Some of these themes could be said to represent interpretative repertoires (Potter & Wetherell 1987), and some repertoires are suggested. However, for reasons discussed in chapter 4 (section 4.3.4), the newness of the technology implies that such repertoires are still emerging; the existence of common themes across discourses does not necessarily imply that common repertoires are being drawn on, although it does suggest that repertoires may be developing.

5.2 The ecology of the Oyster system

Section 2.2.4 in chapter 2 argued that, in the interweaving of technology and lived experience, it is illuminating to consider ecologies of genres and affordances. Such an understanding preserves the local, human-level dynamics of mundane experience (Nardi & O'Day 1999) without making assumptions about the nature of artefacts or interactions with them.

For this reason each of these case study chapters starts by laying out the ecologies which they each present in contrasting ways. It is emphasised, though, that these ecologies are drawn from analyses of interviews with system users and of documentation as well as from situated observation. That is, they are derived from the same data sources as the more directly experiential analyses which follow and for which they lay the foundations.

5.2.1 Affordances at the borders of the Oyster system

A basic policy need is to encourage use of the public transport system. But between the would-be traveller and each mode of transport there are various barriers.

In some cases, there are actually physical barriers: at Underground stations and some overground stations. Even where there is no physical barrier it is clear that there is an "outside" and an "inside", separated by boundary which only ticketed travellers are entitled to cross.

The ecology of affordances (see section 2.2) of the ticket gates and other borders of the transport system is the physical representation of the organisational barrier that separates the service user from the service provider. In being quicker, more reliable, and in not requiring the ticket to be removed from a wallet, smartcards offer some affordance advantages over conventional tickets. However, there are other affordances which represent new barriers for service users.

Some of the less obvious features of gates at Underground stations and of readers on buses are intended to be noticed only by TfL insiders. Staff at a station described constantly listening for auditory signals at the periphery of awareness (Alexanderson 2004), certain distinctive sounds: single beeps for a successful authorisation, repeated beeps indicating a problem.

In the design of artefacts to communicate with the traveller, Oyster uses subtle perceptual clues such as the yellow Oyster symbol indicating "touch here".

However, there are also overt, but often discreet, symbolic messages. In particular, messages which flash up on the ticket gate, and on readers on buses, remind the user of the imminent expiry of a season ticket and of Pay-as-you-go value; however, this may well be missed.

The gate on the right has two displays; the smaller one on the Oyster reader, to the right of the person passing through, shows outstanding balance and other details; this is more pertinent than the acknowledgement shown on the larger, more visible display The gate on the left has one single display, but it is higher and in front of the person passing through.
Source: www.tfl.gov.uk

Figure 10: Two styles of ticket gate showing displays.

5.2.2 Invisible affordances: stored value

Because the Oystercard, unlike a paper ticket, does not display its value, the messages at ticket gates have a special importance; a common occurrence is unexpectedly finding that there is no Pay-as-you-go value left on the card.

This may not be a simple case of running out of value; staff at a station recounted a sequence of events which frequently causes an Oyster user to seek assistance. If a season ticket on the card has recently expired or the user travels out of zone, then the extra cost of the journey is deducted from the stored value. Often the card user is unaware that they have exceeded the limits of their ticket. If there are insufficient funds on the card, then the card will hold a negative balance; the subsequent refusal

of the card at a ticket barrier may possibly occur weeks later, to the confusion of the card user.

These problems are only partially overcome by the affordance of some ticket machines of showing the stored values and recent journeys; this can also be done on the Oyster website, or at a ticket office. The two artefacts, card and reader, or card and website, are acting together in a "*compound mediation*" relationship with the traveller (Spinuzzi 2003a:100). However, this affordance lacks immediate perceptibility, and requires the presence of the user at a specific place (Undergound station, or in front of a computer).

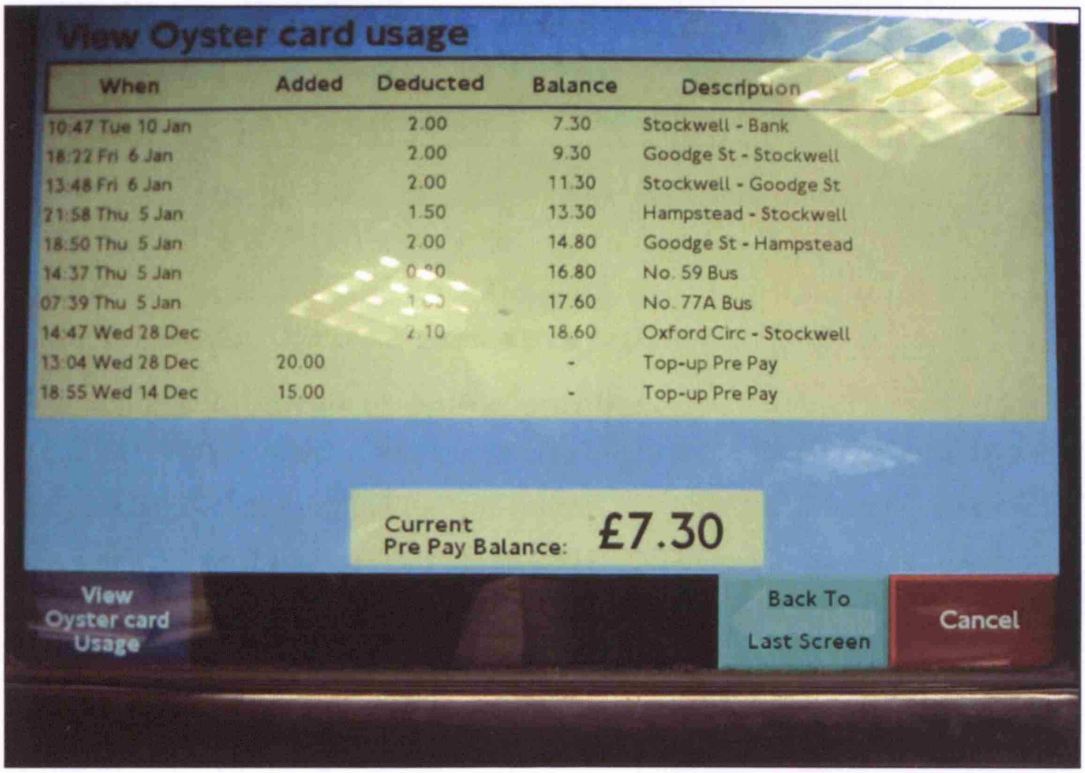

Figure 11: Viewing Oyster usage at an Underground station

Journey history

This statement shows pay as you go journeys using the above card taken between 24/10/2006 and 13/12/2006 .

Please note, it normally takes 48 hours for journeys to be added to your statement.

For legal reasons we are only able to display up to eight weeks of data.

Date	Time	Location	Action	Fare	Price cap	Balance
13/12/06	18:30	Stockwell	Exit	£2.00		£20.70
	18:03	Goodge Street	Entry	£4.00		£18.70
	12:47	Goodge Street	Exit	£2.00		£22.70
	12:23	Stockwell	Entry	£4.00		£20.70
	12:23	Stockwell	Auto top-up	£20.00		£24.70
11/12/06	14:39	Stockwell	Exit	£2.40	Y	£4.70
	14:07	Temple	Entry	£4.00		£2.30

Note the disclaimer that only eight weeks can be shown, the Daily Cap, and Auto Top-up

Figure 12: Viewing Oyster usage on a web page.

5.2.3 A barrier to online purchase

One of the ways in which Oyster is said to improve the experience of buying and using tickets is in the potential for "*off-system*" purchasing of tickets on a website or from a call centre (Monheim & Tuckett 2004). Off-system sales do not necessarily depend on the use of transport smartcards; TfL offered this before the introduction of Oyster. However, smartcards remove the extra cost and delay of mailing physical tickets to the user.

Both period tickets and Pay-as-you-go value can be purchased off-system. However, the purchased value or ticket must be downloaded to the card by passing through a nominated Underground or DLR station or tram stop. There is an overnight delay before this can be done (the delay was 48 hours at the time of most of the data collection). This is a constraint of the technical architecture; values are stored overnight at ticket gates to await download, and these gates can only hold a limited amount of data.

There are no other facilities for downloading pre-ordered period tickets, which is inconvenient for people who, for example, travel mainly by bus, or live in an area not served by the Underground, tram, or DLR[4]. In particular, downloading cannot be done on buses or at train stations; large areas of London are served by train rather than Underground, and buses are generally cheaper and more accessible than rail-based transport.

5.2.4 Breakdowns in the affordance ecology

Oyster offers a new affordance for travellers whose frequency of use does not justify the cost of a period ticket. Using Pay-as-you-go, the user does not need to visit a machine or ticket office to purchase a single ticket; instead, value is deducted as the user touches the card on a reader. However, this relative ease of use is compromised by the failure of Oyster to integrate across all transport modes in London, most significantly the historical, political, and technical barriers to integration of most Train Operating Companies (TOC) services.

As a result, artefacts offer false affordances, or, to be more accurate, *mis-information* about affordances (Gibson 1979; McGrenere & Ho 2000): a ticket gate at an overground train station displays the Oyster logo and so appears to offer the affordance of Pay-for-fare-ability to Pay-as-you-go users, but in fact usually only provides Open-ticket-gate-ability for season ticket holders. A Pay-as-you-go user will find the smooth flow of their journey interrupted by the hard physicality of a closed ticket gate.

As another example of a failure in the ecology of affordances, the introduction of Oyster overlapped with that of the three-door "bendy buses", which largely replaced Routemaster double-deckers on busy routes; early implementation required Pay-as-you-go users to board at the front, where the driver controlled the only Oyster reader. The ease with which passengers were able to board without paying was the subject of press comment (Lyon, Sawer, & Stubbs 2004). More recently, Oyster readers near each door require users to make an intentional effort to "touch in" of their own volition, or risk a fine.

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[4] But see section 5.5.6 for a description of "Auto Top-up" which allows Pay-as-you-go value to be added on other modes

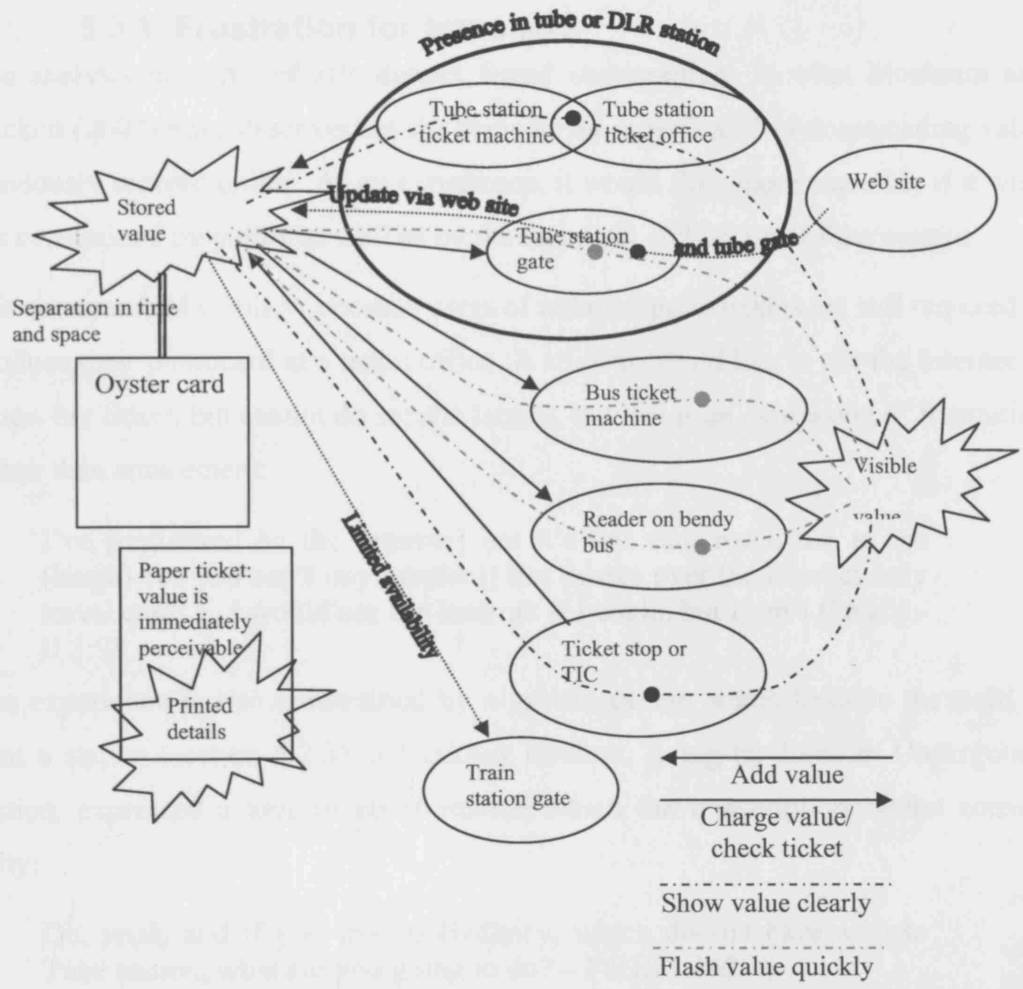

Figure 13: Affordance ecology of Pay-as-you-go value in the Oyster system

5.2.5 A graphical representation

The diagram above (Figure 13) summarises this discussion of the affordance ecology of Oyster. The following section presents experiences related by users of the system, showing how his ecology supports mundane transport needs in some ways, and fails to do so in others.

5.3 Users' experiences with the Oystercard

The previous section analysed the ecology of affordances of the Oyster system and in doing so, laid the foundations for a consideration of the possibilities for action of real transport users. But these mundane breakdowns in flow of daily travel are often strongly felt, emotional experiences. The Oystercard system includes the artefacts analysed above, but it also includes the people, station staff, regular travellers, and visitors, so ecology breakdowns are also breaks in communication between the service providers and the service users, that is, between two groups of people.

5.3.1 Frustration for travellers

The analysis in terms of affordances found shortcomings in what Monheim and Tuckett (2004) have described as the "*wonderful experience*" of downloading value previously ordered online. As an experience, it would flow more smoothly if it were not constrained by policy as well as by the technical architecture of the system.

It is constrained by policy, because users of reduced-price tickets are still required to produce their photocard at a ticket office. A student would like to use the Internet to renew her ticket, but cannot do so; she laughs, but this is an expression of frustration rather than amusement:

> I've [registered on the Internet] but it's not very much use to me (laugh) cos you can't buy [student] bus passes over the Internet only travel cards ... I would use the Internet if I could, but I can't (laugh) - II 3:98

The experience is also constrained by a system design which leads to the need to visit a station (section 5.2.3); a Hackney resident, living far from an Undergound station, expressed a tone of consternation which the transcription cannot convey fully:

> Oh, *yeah*, and if you live in Hackney, which doesn't have a close Tube station, what are you going to do? – FG3:P1:162

People who travel through TOC rather than Underground stations are inconvenienced in two ways; not only can they not download value to their cards, but also they cannot use Pay-as-you-go at these stations. They might travel from a suburban station to central London, leaving through an Underground station and paying with their Oystercard, but are unable to do the same on the return journey. Rationality fails; station staff cope as well as they can with situations for which there appear to be no clear rules:

> and on the way back, what happens is I get on the train which doesn't, often doesn't have .. a conductor, .. like a ticket collector, ... so you can't even buy a ticket on the train, and then I get off at .. somewhere where I can only get out with a valid ticket .. so sometimes I've just waved a prepay card, and sometimes they treat it as if it's a, you know, sometimes they let me out, and sometimes they let me go and buy a ticket once I get out ... It's just insane, completely ridiculous - II5:54

The interviewee understands the situation, but is nevertheless confused by the unpredictable responses of staff. There is a practical difficulty; he would pay the

fare, but sometimes there is no ticket collector. He prefers to pay honestly, but sometimes simply showing the blank blue card is taken as a form of payment. There is a conflict; to be sure of paying the fare correctly, he must make a special effort to travel through a station which is not the most convenient. All in all, "*it's just insane*".

5.3.2 Flying blind: the opacity of the card

The blankness of the card, not showing its face value, is sometimes a problem for staff who need to check a ticket, as the previous section has shown. However, for the user of the card, there is the sense of "not knowing" what is on the apparently blank card:

> here, you're kind of, like, you're flying blind, you know - II 4:161

As well as requiring trust on the part of the user, this blankness, or *opacity* in the sense that the value is hidden from the user, leads to practical problems, if the user is unaware of the stored value and period tickets on the card, or is charged unexpectedly.

For those who have registered their Oystercards and set up a login account, it is possible to check its current value online; but it seems that this, and the similar facility for showing card details at a station ticket machine, is not well-known. This is compounded by the complexities of the fare structure and the combined capacity of Oyster as both a medium for period tickets and for stored value:

> P4: I'd be more reluctant to have a prepay ticket with an Oyster card, the one I have is just a season ticket, because of all these issues about it not reading properly or you being charged extra if you happen to hit the thing twice, or whatever
>
> P2: but the exact opposite of the, the way the Oyster card works with these, all these secret sort of amounts that go off or on you don't actually see, is the bus tickets with the little .. um ..octagonal .. um tabs that you tear off, you know exactly how many you've used, you know exactly how many you've got left, it's very, very simple FG2:P4 and P2:544

P2 is referring here to the "Bus Saver" tickets, sold in books of six; other interviewees made similar comments about the (now discontinued) "Carnet" tickets. The simple point is that such tickets, in contrast with Oyster, are not only visible but tangible, one ticket for each trip. The apparently simple physicality of the tickets and the virtuality of the Oystercard draw emotional responses: these two participants

do not exhibit the kind of trust which the Oyster system relies on; instead, they express uncertainty both about the possibility of technical failures and that the blankness of the card is hiding "*secrets*" from them.

5.3.3 Complex practical problems

The simple opacity of the card, considered in terms of an ecology of affordances in section 5.2.2 above, leads to the kinds of practical problems in the lives of service users. These problems can follow a complex combination of events, as the following sample from a focus group illustrates:

> generally I don't like Oyster card, cos, um, when it expires, it doesn't really tell you so, it will tell me on the screen, but actually it won't remind you, ... so, one time I went, yeah, one time, and, I go through it, and I don't know that I, my Oyster card expired, so they just charged my prepay ...
>
> And also when, also when I first used it, I don't really realise, I go to visit my friend, in High Barnet, which is like zone 5 and, "Oh, my God", I don't really realise that it was charging me, ... so I went to customer service, I talked to them, and said, "oh, it's not working", and they said, "oh, you know you have, like, a limit, you haven't paid your prepay", or something like this - Student FG:P3:52

This speaker came to understand that the situation of unexpectedly running out of funds is related to the lack of display on the card and insufficient display at points where payment is deducted. This understanding, however, was reached only after being charged unexpectedly. The apparently "free" journeys to a distant fare zone were in fact being charged, so that "*oh, my God*", the participant's prior understanding of the situation required a rapid revision. This revision was not enabled by technology; making sense of the situation required interaction with other *people*, the intervention of "*street-level*" public servants (section 3.2.4), to handle its complexity and contingency.

5.3.4 Increasing fairness: the Daily Cap

What is "fair" in transport ticketing? What do service users consider to be "fair"? Daily Capping is an aspect of fairness because charging for many single fares on Oyster while a day travelcard gives unlimited travel for a fixed price is perceived as "unfair".

Although it was not then available, this simple idea was already prefigured by interviewees:

> I's actually just telling one of my friends that I'm coming to do an interview and he said ... I'm amazed they haven't introduced a scheme like u:m being able to ... say take a journey .. and .. say if you have to do another journey in the same day yeah, that it'll then charge you for like .. for a return, and then if you do another journey it might charge you for a day pass so that then people wouldn't care they'd always know they were getting the cheapest fare and they'd probably travel more - II 1:90-95

Some Oyster users are concerned to minimise their travel expenses; an early user described carefully recording Pay-as-you-go fares on a PDA, and calculating the savings over a period ticket. This was before the introduction of the Daily Cap; minimising Pay-as-you-go expenditure at that time involved careful planning, of the sort described by a focus group member:

> Quite often I weigh it up for hours .. what I'm going to do in the day, and it's like, "if I go that way then", ... I mean, like yesterday, it was actually cheaper to come back a long way round, 'cos I didn't have to travel through zone two on the Tube – Cyclist FG:P3:360

On the one hand, users *wouldn't care* if they could be sure that they were always being charged the lowest price, but on the other hand this requires trust by the user in the correctness of the system. This is trust not only that the system has recorded the fare accurately, but also that the cheapest option is calculated correctly; and the algorithms, with different zones and times of day as well as new fare options to take into account, can be complicated:

> P2: If they're going to make the fares even more complicated then it's going to be impossible to work //P3:(laugh)// out what is the cheapest way of doing it

But possibly this can be overcome by "them" doing the sums:

> P3: Yeah, but they'll make it as complicated as they like if they're going to do the sums for us (laugh) - Cyclist FG:P2:876

There are two sets of constructions in these discourses: one of careful calculation to minimise expense, the other more low-tension, trusting in the system to automate fare collection with little effort on the part of the payer. These contrasting discourses might be softened by greater transparency, but, as will be shown later in section 5.5.6, they have continuing resonance despite more recent developments in the Oyster system.

There are similar high and low-tension discourses around the of loss of privacy from recording of travel data; for some, this is a trivial matter, while for others, it is a

concern to be balanced by the relative convenience of using Oyster, and the increasing trouble and expense of using cash or traditional tickets.

5.3.5 Fairness promotes social inclusion

Fairness is also an issue for the social exclusion of some groups of potential Oyster users; as the financial incentives for using Oyster become more stringent, so the existing disadvantages for those who, for various reasons, are excluded from using Oyster become more severe. In this case study, the problems faced by disadvantaged groups in using Oyster were investigated through interviews with key staff of advocacy groups working to ensure that all sections of the community are represented in transport policy.

The first barrier to use is in learning about Oyster in the first place; publicity to promote the use of Oyster (see Figure 14 below) did not explain clearly the working of the Oyster system. Yet the Oystercard is rather different from a traditional ticket, and transport advocates believe that, especially among people who do not read or understand English well, there is a lack of understanding about Oyster, even if there is a high level of general awareness. Understanding the overall ecology of Oyster relies on a fairly sophisticated grasp of abstract concepts, but Oyster must be equally usable by people who, recalling the four "myths" of technology from section 3.4.6, may have a resistance to technology use in general:

> It's a community where people, you know, *don't* read very much, a *lot* of this stuff, information is *word of mouth*, so, once their *neighbour* or their *friend* has got an Oyster, a neighbour or a friend then starts telling them about Oyster, you know, and how you *do* it and what it's about, save some *money*, and I *think* that's the process.
>
> I think *initially*, people thought, "no, no, no, no", but now they're probably *still* not *reading* very much about Oyster, but they're *hearing* it from friends and family - (LPTG 2004)

This presents a rather different viewpoint on transport users' ways of responding to usability problems, and, on this basis, it seems that informal networks are at least partially effective in overcoming cultural barriers to Oyster use. But there are also financial barriers; to take full advantage of the Oyster system requires access to the internet, a good level of computer literacy, and a bank account with credit or debit card. People on a low income are less likely to have all of these pre-requisites. They may also be unable to afford the initial outlay on the older "carnet" or pre-paid paper tickets, despite the long-term savings, and this applies as well to Oyster Pay-

as-you-go, although at the same time the policies underlying Pay-as-you-go are designed to extend the benefits of Oyster to less-frequent, possibly less well-off, transport users. Finally, the Daily Cap is even more essential to minimise the cost for those on low incomes.

5.4 Analysis: the inseparability of ends and means

This first case study highlights particular aspects of the experience of living with e-government: making sense of, but also making use of, technological systems; embedding intransigent artefacts into routine life; encountering interfaces in passing. The Oystercard is mundane, even dull; at a certain level, it is only a ticket, an electronic extension to a well-established system of revenue collection. Yet there are findings of "*strong motivations, deeply-felt intentions and complex histories*" (Boland 1991:453) even in the apparently hard, objective application of a ticketing system.

5.4.1 Technomethodology, abstraction, and meaning

One view of Oyster is that it is enabled by technology to reduce barriers to use of public transport; details of the ticket-buying process are abstracted so that the user "flows" smoothly through the system.

Conversely, the research participant who reported comparing his Pay-as-you-go fares with the period ticket and calculating the money saved demonstrates a continuing need for transparency in the Oyster system, which, however, is constrained by the architectural opacity of the card.

The word "*technomethodology*" has been synthesised by Dourish and Button (1998) from *ethnomethodology* (Garfinkel 1967), a detailed study of the ways in which people make sense of the world, suggest that people are able to make sense of technological interactions, provided they have sufficient information to do so.

As Dourish and Button argue, and as in the example above of the failure of the genre ecology for users of train or bus rather than Underground services, sometimes a user *does* need to access some of the underlying complexity. In ethnomethodological terms, systems should be designed to be *accountable*. There are several ways in which this might be achieved: the design of ticket gates might make the display of value on the ticket more visible, or the use of the Internet and machines at stations to show current value might be made more widely known.

The findings of this chapter suggest that, while some users will trust the system and be unconcerned about the details of charges, others will desire the same level of accountability as is provided by traditional paper tickets.

5.4.2 Oyster as means and end

The Oyster system involves many objects, but revolves around a single artefact, the card itself. Despite this apparent unity around the central artefact, the failure of Oyster to fit into users' travelling needs cannot be localised to a single interface, but lies in "*the interaction of artefacts and users' practices*" (Spinuzzi 1999:19), in ways analysed in the affordance ecology in section 5.2.

What has been called in this chapter the "opacity" of Oyster and the inconveniences with downloading value to the card are specific instances of a more general phenomenon. Gaver (1996) has shown the social consequences of the fundamental difference between the affordances of paper and electronic media. For paper the medium of storage is the same as the medium of display, whereas for electronic channels they are separate. This leads Gaver to define an affordance of "*predictability*" (Gaver 1996:7); electronic media do not, in general, afford predictability, compared with paper.

This viewpoint clarifies the limitations as well at the potential of Oyster; as Gaver says, electronic systems "*have different affordances, and fill different social niches*" than paper (Gaver 1996:8). Mediated actions are not simply another way of performing unmediated actions, but qualitatively change the activity (Spinuzzi 2004).

From this perspective, Oyster cannot be expected to fit the same role as traditional paper tickets, but on the other hand it might be able to act in new ways as a different form of payment for transport, and perhaps also for other goods and services. The means, in other words, do not simply serve the ends, but help to define them.

5.4.3 Breakdowns in the composition of experience

At the time of Gaver's (1996) writing, computers were inflexible and cumbersome compared with paper. Now, computer-related devices such as the Oystercard are relatively light and convenient (although still falling short of what can be imagined), and have affordances which allow faster interactions than are possible with paper.

From these affordances, the action of using the Oystercard should be "*automatic*", "*fluent*" (Forlizzi & Battarbee 2004), or transparent, in Ihde's (1979) terms; the user is only peripherally aware of the touching of the card on the reader, and is concentrating on passing through the barrier, and, beyond that, on continuing their journey. An ideal model is of a user whose Pay-as-you-go balance is automatically maintained with no need for special action on their part.

But, for a number of reasons which this chapter has highlighted, the smooth flow might be interrupted by a breakdown (section 2.3.4 in the general discussion of artefacts in practice; section 5.2.4 in this chapter). Such interruptions are a break in what McCarthy and Wright (2004) have called the *compositional "thread of experience"*; the experience lacks wholeness and completion, it is frustrating and, in Dewey's (1934) terms, *unaesthetic*.

Barriers in this sense are a metaphor, but also a physical reality, as ticket gates open and fares are collected with minimal conscious effort by the traveller, or, in the case of breakdown, fail to do so. A ticket barrier in such a breakdown becomes "*present-at-hand*" (Heidegger 1962) in the most physical possible way; it is no longer a gate to pass through, but takes on the affordance of "deny-passing-ability". For TfL, conversely, in the case of a card which lacks sufficient value, "deny-passing-ability" is the precise affordance for which the gate is designed.

5.4.4 Sense-making with Oyster

The concept of "fairness" and the questions over trust and privacy have raised a number of separate but related issues. There is annoyance, or perhaps amusement, at the perceived lack of co-ordination over Oyster readers on the bendy buses, and the delayed introduction of the Daily Cap.

This chapter has presented some examples of transport users making sense of their experiences with the Oyster system. The person who was charged unexpectedly for trips to zone 5, for example, had previously made sense of the "free" trips on a way which proved later to be incorrect. A revised understanding was the outcome of this event, but the point is that both *a priori* and *a posteriori* understandings are coherent within their restricted self-organising settings. It is not necessary to posit a "mental model" underlying the sense which the user made of it; the understanding is consistent in itself.

One particular finding which stands out from the interviews is the ability of users to make sense of the system, to readily grasp complex sequences of affordances. From exploration and experience, users are able to understand immediately "*hidden affordances*" (Gaver 1991:80): the storage of value, the charging of Pay-as-you-go, the ways these work together with displays at stations and on the Web page. Even in cases where their understandings were later found to be incorrect, they are able to rapidly form new understandings and to use them as the basis of appropriate action.

Transport users creatively construct the meaning of the Oystercard, dialogically responding to the system as a centre of value, and imagining how it might be otherwise. For example, interviewees imagined functionality similar to that which was eventually implemented in the Daily Cap (section 5.3.4), countering the belief of TfL and their contractors that this concept might be too difficult for transport users to understand.

5.4.5 Layers of experience

The breakdowns in the affordance ecology present a failure to meet routine needs for user: the need to visit a particular station to download value, the inconvenience of running out of value on the card. Experience is multi-layered (Dourish 2001; McCarthy & Wright 2004); the physicality of ticket barriers and other artefacts provide affordances; the compositional understanding of affordances are joined together as ecologies; ecologies fit seamlessly into the mundane needs of transport users, or, conversely, present new barriers, leading to simple automatic flow through the system, or annoyance at a blockage.

To a certain extent, the failure to meet everyday contingencies is overcome by the intervention of "*street-level*" staff; recall the narratives of the TOC user in a station (section 5.3.1). This suggests that human rationality cannot yet be fully replaced by administrative-technical processes (Zouridis & Thaens 2003). The continuing need for human discretion (Bovens & Zouridis 2002) compromises the business driver which aims to free ticket office staff for other customer service roles (section 5.5.2). Yet the contingences must be overcome, if necessary by staff intervention, if the other business driver to reduce barriers to public transport is to be satisfied.

5.4.6 Experiences in practical use of Oyster

At another layer of experience, physical experience of travelling on public transport is embodied and therefore *sensual*, the comfort or otherwise of the experience having emotional impact on the overall experience of travel. The simple experience of finding that Pay-as-you-go has run out leads at least to annoyance, it "*peeves me off*" - FG3:P1:138, and perhaps to the embodied experience of being denied access to travel, as for example on buses in central London where cash fares are no longer allowed.

Such experiences are emotional in that they involve not only cognition but "*willing, desiring, and feeling*" (Turner 1986:35). This is clear not only in the annoyance or amusement which surrounds some of the problems people have found in using Oyster, but in the clash of personal values as people feel they are being coerced to using Oyster despite their privacy fears or practical inconveniences; one of the focus groups raised heated debate around the recording of journeys by the Oyster system.

But these small daily experiences are emotive not despite but *because of* their interpenetration with wider daily needs. For the traveller, the "*self's own time is constantly open, it resists ... framing limits*" (Holquist 2002:37), or, in prosaic terms of Interaction Design, as Stephens (2005) puts it, when passing through a ticket gate or using a ticket machine, "*the user's mind is more likely to be elsewhere (thinking about that argument they had this morning, or multitasking on an important task)*".

5.5 Implications for policy

In the introduction to this chapter, it was asserted that Oyster provides a privileged vantage point for understanding the inter-relationship between policy and user experience. This has been expanded on in terms of the physicality of the card and the affordances of the system as a whole, and of peoples' experiences with and around it. This section justifies the claim that these interactions and experiences arise from, and feed into, policy decisions at all levels. It starts with a brief review of the history of the Oyster project, since this is instructive in terms of the development of policy around technical potentialities.

5.5.1 Building the business case

Historically, the use of transport smartcards in London began with a specific need to handle "net cost", that is, payment per passenger journey, of de-regulated bus operations. The use of smartcards on other modes of transport came later.

Later policy changes removed the need to support "net cost" payment for bus services, and this early system never became operational, beyond some trials in north-west London (TfL 2004b). However, the need at around the same time in the early 1990's to renew the London Underground ticketing system coincided with a desire to reduce ticketless travel (fraud) and, related to this, to install ticket gates at 150 suburban stations (central London stations were already gated) (TfL 2004e).

When TfL was formed and took responsibility for other transport modes, there was a need for integrated ticketing including the DLR and Tramlink; so although the initial cross-allocation of fares on buses was no longer a requirement, there were new fare accounting needs.

The business case only became sufficient, however, with the realisation that a smartcard brings additional policy benefits, which are called "social" in the sense that they are less specific to particular business imperatives: cutting queuing times at stations, and boarding times on buses, increasing integration across modes. On buses in particular, speed of boarding is important to maintain the reliability of the service (TfL 2004d; TfL 2005c).

In these ways, it was not one single imperative but a number of needs which "built" the business case and allowed the introduction of the Oyster system. Together, these business drivers reflect a wider policy aim to "*make public transport more attractive*" (GLA 2001c) within the overall GLA transport strategy.

5.5.2 From business case to policy

For TfL, the Oystercard affords fraud protection; it affords new fare options; it affords cashless travel and possibly savings in the cost of sales.

According to a senior TfL manager, the business drivers of Oyster are:

- To remove barriers to Public Transport - a step change in ease of buying and using tickets
- To improve journey times on buses by eliminating cash transactions

- To free staff from ticket office by reducing dependency on staffed outlets (TfL 2004d)

The wider policy aims, suggested by the business case, are not as clearly specified in published documentation, but one document partially reflects these drivers: Oyster is said to be "*reducing queues at Underground stations and time spent by buses at stops*" (TfL 2004i:3). In addition, Oyster, beyond its original design drivers, offers new fare policy possibilities, of which peak and off-peak fares are just an early example (TfL 2005c).

A final crucial policy aim is the potential to facilitate inter-modal transfers (GLA 2001c; TfL 2004e); although, as has been discussed above, this is currently limited in the case of TOC services. The incompatibility with TOC services is as much an outcome of policy decisions as of technology; as well as the historical separation of TOC and TfL services, enabling Oyster Pay-as-you-go on TOC services might solidify the proprietary Oyster standard at the expense of ITSO (House of Commons Transport Committee 2006).

5.5.3 From policy to affordance ecology

Some breakdowns in the affordance ecology of the Oyster system have been analysed earlier in this chapter. However, it would be wrong to see these as necessarily failures in implementation, but rather as outcomes of intentional policy decisions.

For example, when the current balance and fare deducted flashes up quickly at gates at stations and ticket readers on buses, this is easily missed by a traveller; but on the other hand, this very short display prevents following transport users from seeing the value, and thereby creating a security problem as well as a privacy issue for the user (TfL 2004f).

Similarly, the delay in the introduction of the Daily Cap arose, in part, from the complexities of the fare structure; there are reputedly over 1 million possible ticket combinations. TfL was concerned to ensure that the systems can handle all of the possible combinations correctly, and to maintain credibility with service users (TfL 2004e). There was also a fear, which the evidence presented in section 5.4.4 refutes, that the concept of capping might be too complex for service users to understand (Transys 2004).

A further example of the interplay of ongoing policy development with the usability of the system is the need, referred to earlier as a barrier to transparency, to pass through a nominated station when downloading value to the card. Although the 48-hour delay on download of data from the online payment system to station gates has been reduced to overnight (pay before 23:00 the previous day (TfL 2003a)) and may in the longer term become near real-time (TfL 2005c), this remains problematic.

TfL is aware of the unsatisfactory nature of this requirement and acknowledges this to be a "*bolt-on*" to the original system (Monheim & Tuckett 2004); more recent developments (section 5.5.6 below) partially circumvent this issue.

5.5.4 Policy by design

At the same time as addressing usability issues to the extent that the architecture allows, there are increasing financial incentives to encourage the use of the Oystercard over cash fares. As from January 2006, the Daily Cap is generally 50p lower than the cost of an equivalent paper daily travelcard, and single fares are even more discounted: a single zone 1-2 Underground fare outside weekly daytimes is £1.50 Oyster but £3.00 cash, for example (TfL 2006b).

Policy, then, is continually changing, both to respond to shortcomings of Oyster and to encourage its use, while new fare options, for example off-peak fares, are enabled by the electronic system.

In interview, a senior manager at TfL argued from the well-known, and often misunderstood, "*garbage can model*" of Cohen, March, and Olsen (1972) that e-government projects are too often "*solutions in search of problems*".

However, as the historical development of Oyster illustrates, the business case is "built" from a number of expected benefits (TfL 2004e). The "garbage can" model is not necessarily pejorative, but rather an attempt to understand how decisions may be reached without assuming rational means-ends; goals and the technology to meet them may be hazy: "*Despite the dictum that you cannot find the answer until you have formulated the question well, you often do not know what the question is in organizational problem solving until you know the answer*" (Cohen, March, & Olsen 1972:3).

The previous section showed how public policy may find its physical manifestation in affordances of artefacts but conversely be constrained by other affordances of the overall ecology. The use of fares policy to encourage take-up is significant as an example of "*organizational problem solving*" in which TfL needed to already "*know the answer*", because it both relies *on* the affordances of the technology, *and* uses those affordances, through the means of fares policy, to provide the capacity to encourage use of Oyster.

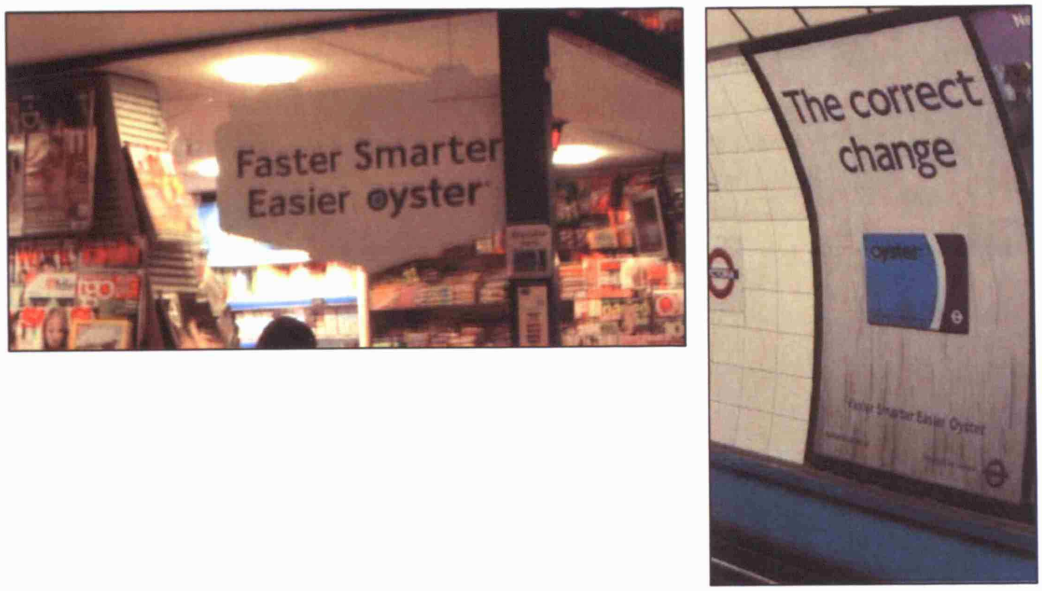

Figure 14: Traditional means to encourage use of Oyster

5.5.5 Policy and lived experience with Oyster

These design decisions, driven by policy aims and by business needs, are experienced by transport users in ways which may or may not be the intended outcomes of the policy designers and implementers.

What have been called border problems, and the breakdowns and lack of transparency they engender, contrast with the simple physicality of traditional tickets. Oyster does offer the faster boarding and passing through ticket gates and reduced need to buy tickets that it promises, but at the cost of introducing new barriers to transport use. For anyone travelling in London without an Oystercard, a visitor perhaps, there are financial as well as increasing practical barriers; cashless buses in central London, for example.

The need for the passenger to remember to debit their Pay-as-you-go on a bendy bus, to remember to top-up and to renew season tickets without the visual cognitive aid of a printed ticket, and to remember to pass through the nominated station to collect updated value, are all extra loads on the mental effort required of transport users.

The following section analyses some recent changes to the policy and affordances of the Oyster system, but, as will be shown, these tend to confirm rather than refute the findings presented in this chapter.

5.5.6 Continuing policy change: Auto Top-up and other recent developments

A system of *Auto Top-up* was introduced in September, 2005 for Underground and DLR users. This function automatically adds a pre-set amount of Pay-as-you-go value to a card once its value falls below £5 (TfL 2006b). As from June 2006, this has also been available on the bus and tram.

This new feature partially overcomes the limitation on downloading Pay-as-you-go value. Unlike online purchase, Auto Top-up does not allow ad-hoc payments or renewal of season tickets; this greater simplicity allows for a different technical architecture and so removes the need to pre-nominate a station and allows for its availability on buses (TfL 2005c). However, this requires still more trust on the part of the user; not only are fares charged in the opaque way discussed in section 5.3.2 above, but value is transferred automatically from the user's credit or debit card.

There is also a significant recent change in the situation regarding TOC services. In February, 2006, TfL announced that as from November, 2007, four London rail services will run under the authority of TfL; amongst other changes, this will make Oyster Pay-As-You-Go available on these lines. Additionally, a new rail franchise will be required to support Pay-As-You-Go from 2009 (TfL 2006d; TfL 2006g).

The most recent policy change is a clarification of the charge made when a user fails to "touch out" correctly. Previously, the practice was to charge a minimal fare in case of an "incomplete journey". Since November, 2006, a charge of the maximum cash single fare for all zones is made against the card on entry to the system, (normally £4), which is then partly refunded when the user "touches out". Thus, in addition to the effort required of transport users to ensure that they "touch out"

correctly, there is a new responsibility placed on them, with the sanction of a higher fare charged should they fail to do so.

5.6 Conclusions

This first case study has started to show empirically the significance of the theoretical claims made in chapters 2 and 3 of this thesis. It was suggested in the conclusions to the literature reviews (section 3.6) that locating research outside the workplace might throw a new emphasis on the embodied physicality of experience. This chapter starts to justify that assertion in the ways in which the affordances of an emerging system interact with the embodied experiences and practices of service users: for example, meeting the hardness of a ticket gate, fumbling for a coin on a bus, or using a different route in order to avoid a higher fare.

5.6.1 Understanding simple and hidden affordances

The ideas of transparency and its converse, opacity, as used in this chapter have both their common meanings and meanings taken from the phenomenology of Ihde (1979). In the common sense, Oyster is opaque because its stored value cannot be seen without the compound mediation of other artefacts; these other artefacts provide some transparency.

In the phenomenological sense, it is transparent when it works as normal and allows a user to pass through a gate or board a bus or tram; it becomes opaque only if there is some breakdown. Taking transparency as an ideal, it could be said that Oyster is ideally transparent in use, but is opaque in its affordances. The simple affordances of traditional tickets, for example the tangibility of the Bus Saver or Carnet tickets, contrast with the opacity of the Oystercard.

Thus "open-ticket-gate-ability", although not directly perceptible, is immediately grasped by users; but the *opacity* of the card adds to the complexity of the sequence of affordances of which this is the culmination. These findings parallel the ethnomethodological insight that people encounter interfaces in a variety of *situations* (Dourish & Button 1998; Suchman 1987), and are able to *make sense* of them drawing on their experience and on the account which these systems offer of themselves.

5.6.2 Ends and means in public policy

In all interactions, there are multiple layers of experience (Dourish 2001), which, as McCarthy and Wright (2004) observe, are often interpenetrating; the experiences with the Oystercard as artefact, with Oyster as a system, the overall experience of travelling around London - for transport users, all of these are only part of their daily experience of work, leisure, and living in or visiting the city.

This chapter questions the apparently simple means-to-ends understanding of Oyster. It is not a simple means because, emotionally, it makes demands of trust and sense-making on the part of service users, and opens itself up to acceptance or resistance. But to encourage acceptance, policy-makers have designed a fares policy which strongly encourages use of Oyster rather than cash, supplemented by a marketing campaign.

To suggest that means simply serve the ends is to revert to a dualism of ends and means which is contradicted by the intimate interweaving of affordances, genre, and experience shown in this chapter. Dewey (1929) criticised the raising of ends over means; this, he said, is like the social division into a labouring and a leisure class: "*Means are menial, subservient, slavish; and ends liberal and final*" (1929:124).

The implementation of Oyster is an end for TfL, but a simple means for transport users. Throwing light onto the means, as this chapter has done, not only demonstrates again the inseparability of means from ends; it also brings to the foreground the experiences, emotions, and sensuality which means engender.

5.6.3 Unfinalisability for transport users and policy-makers

The interweaving of policy with the physical artefacts of ticketing systems and the technological systems which lie behind them, the gradual emergence of the construct of the Oystercard, the way TfL management built a business case, and the continuing small changes in policy around the card, point to the *unfinalisability* of Oyster. For users, the incremental introduction of new technical features and the continuing changes in fares structure and fare policy, present a set of experiences which are always unfinished.

Experience is, as McCarthy and Wright put it, not between the opening titles and the credits (from analogy with the experience of watching a film (McCarthy & Wright

2004:103)). For policy-makers, Oyster is continuing to develop, as section 5.5.6 shows. Some of the issues raised in this chapter - the need to visit a particular station to download value, the use on TOC services - have been, or are being, corrected.

For the transport user in mundane daily life, experience with Oyster is not limited to the fleeting moment of touching a card on a reader; not limited, either, to the duration of the journey on transport, even though a journey on the Underground may be an intense experience. Any journey, to work or for leisure, is a means to wider ends.

For the service provider and the policy-maker, Oyster, and transport smartcards generally, are continually open to changes in meaning. The example of local authorities issuing combined Oyster and citizen cards is an indication of the possibilities; the longer-term idea of combining Oyster capabilities with personal devices such as a mobile phone is another. Just as a view of the telephone as definitely and only a medium of auditory communication misses its potential as a text or pictorial medium (McCarthy & Wright 2004:69), so a view of Oyster as only a ticket is a foreclosing of its potentiality.

5.7 Chapter summary

Research contribution	**Contributions of this chapter**	**Mainly in sections**
Breaking the flow: breakdowns interrupting the seamless journey	Compound mediation of multiple affordances	5.2.2, 5.2.5
	Single object is centre of web of artefacts; problems with affordances; extending (un)-predictability to complex mediation and ubiquitous devices	5.3.3, 5.4.2
	Different social ends of different affordances; paper and electronic media	5.3.2, 5.4.2
	Breakdowns leading to interruptions in smooth flow	5.3.1, 5.3.3. 5.4.3
	Opacity of the card, contrasting with affordances of paper ticket	5.2.2, 5.3.2, 5.4.2
	Interaction on the periphery of awareness; auditory affordances of ticket barriers; border features of ticket barriers: hard to see stored value	5.2.1, 5.2.2, 5.4.1

Research contribution	Contributions of this chapter	Mainly in sections
	Breakdown: accidentally using stored value; running out of value unexpectedly; relates to opacity of the card	5.2.2, 5.3.3, 5.4.2
	Delay in adding value, need to visit a station	5.2.3, 5.3.1, 5.4.3
	Breakdown: using Pay-as-you-go on "bendy buses" required front boarding	5.2.4
Multi-layeredness of prosaic experience	Meeting or failing to meet mundane needs; physical, compositional and emotional levels of experience	5.4.5
	Opacity leading to travelling out of zone, intentionally or accidentally using stored value, or going into negative balance; consequent loss of card value	5.2.2, 5.3.2, 5.3.3
	Unavailability of Pay-as-you-go on TOC services; false affordances of TOC ticket gates, confusion at the station	5.2.4, 5.3.1
	Adding value to the card for those whose journeys do not pass through a tube station; overnight delay; inconvenience, annoyance	5.2.3, 5.3.1
Making sense of experience; travellers understand complex affordances; importance of social interaction	Oyster as an abstraction, hiding some complexities; users do need to understand some underlying complexities: the need to pass through a station, the calculation of the Daily Cap	5.3.4, 5.4.1
	Continuing need for street-level staff to handle contingencies	5.3.1, 5.3.3, 5.4.5
	Grasping complex affordances; coming to an understanding of problems; understanding online purchase	5.3.3, 5.4.4
	Imaging a better service; refiguring the Daily Cap	5.3.4, 5.4.4
Felt life; challenges to personal values lead to unsatisfying experiences	Fairness, privacy, trust The Daily Cap is an issue of fairness for Pay-as-you-go; carefully calculating fares, "automatic" fare collection	5.3.4, 5.4.4
	Shock at being charged unexpectedly	5.3.3
	Frustration, inability to use on some services	5.3.1

Research contribution	Contributions of this chapter	Mainly in sections
	Clash of values; privacy and convenience	5.3.4, 5.4.5
Policy and technology; policy and technology build together	Building the business case: potential for new policy options; Daily Cap, fraud protection,	5.5.1
	Policy contingencies: need to upgrade ticketing, net-cost and gross-cost ticketing on the buses	5.5.1
	Strategy aim of seamlessness is compromised by lack of availability on TOC services	5.2.4, 5.3.1, 5.5.2
	Unfinalisability in policy; the "garbage can model" in conditions of uncertainty and emergence	5.5.4, 5.5.6
	Policy design leading to usability issues; displays at gates, need to buy student cards at station, Daily Cap	5.3.1, 5.5.3
	Policy to encourage use of Oyster leading to clash of values; fares policy encourages Pay-as-you-go over paper travelcards	5.3.4, 5.5.4
	Responding to usability shortcomings; continuing policy change; Auto top-up	5.5.6
	Implications of affordances for role of Oyster for as ticket and other payments	5.4.2
	Social inclusion/exclusion	5.3.5

Table 5: Summary of contributions of the Oyster case study

Chapter 6
Case study 2: The Central London Congestion Charge

Like the Oystercard and the Journey Planner, the Central London Congestion Charge (CLCC) is a very high-profile project for TfL, as well as being key to TfL's own policy aims. However, unlike these two, it has also received a high public profile and is highly politically charged. For example, similar schemes in other countries have failed, not because of technological feasibility but because of the failure to devise a politically acceptable pricing model (Begg & Gray 2002).

Electronic technology is involved in implementation of the CLCC in at least three areas:

1. in detection of travel within the zone
2. in co-ordinating detected vehicle movements with payments, and in the issuing where necessary of penalty charges and other enforcement;
3. in the payment of the charge.

It is the third of these which gives rise to the main citizen-facing transactions; however, they are all implicated in the overall experience with the CLCC.

The high political profile and the consequent constraints on implementation, the changing technological possibilities, and the long and continuing history of debate around the principles of congestion charging suggest that the systems around the CLCC are a particularly appropriate study for understanding the implementation of public policy with e-government.

6.1 The Central London Congestion Charge

The Central London Congestion Charge was introduced in February, 2003. The single charging zone covers a rather small (21 km^2) area within the Inner Ring Road, but as from February, 2007, it will be extended to a slightly smaller Western Extension Zone covering part of Kensington and Chelsea.

The introduction followed several years of discussion and research (Government Office for London 2000), and the Greater London Authority Act 1999, which is the legal basis of the Greater London Authority, specifically required the Mayor to

produce an integrated transport strategy, of which consideration of road user charging is a fundamental part (GLA 2001d; GLA 2001f). Enabling legislation to allow local authorities to charge road users was proposed in the 1998 Transport White Paper and implemented in the GLA Act (Department for Transport 1998; Greater London Authority Act 1999).

Road pricing in various forms was being considered as early as the Smeed Report of 1964 (Smeed 1964). The Road Charging Options for London (RoCOL) report, prepared by the Government Office for London before the coming into being of the GLA, considered a number of enforcement methods, including paper licences displayed on windscreens and electronic road pricing.

Following the RoCOL report, a system was selected which differs from many other congestion charging and road pricing schemes in other cities. The system does not work using electronic tags or other vehicle modification, but on the basis of camera recording of number plates (Automatic Number Plate Recognition, ANPR) at entry and exit from the zone and while driving in the zone (TfL 2005b).

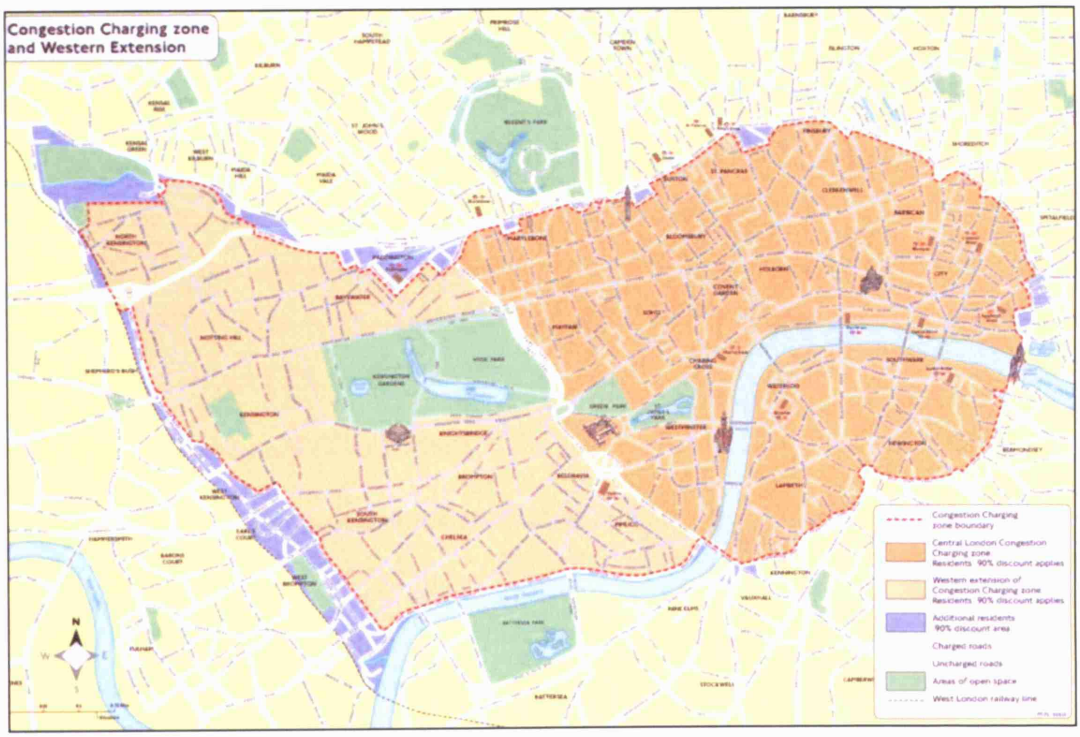

Figure 15: Existing CLCC charging zone and Western Extension Zone.

Source: http://www.tfl.gov.uk/tfl/cc-ex/pdfs/CC-Map-6-Master.pdf

The timescale was an important factor in the choice of implementation scheme; a simple scheme using paper licences could have been introduced in 2002, but the necessary public transport improvements would probably not have been ready before 2003. Conversely, more sophisticated electronic systems could probably not have been in place before the end of the Mayor's first term of office in May 2004 (Government Office for London 2000).

Some strong supporters of the principle of congestion charging have criticised the scheme as implemented in London, not on usability grounds but on the understanding that it is piecemeal, not economically efficient, and not fiscally neutral since it is in addition to fuel and vehicle duty (Begg & Gray 2002).

6.1.1 Paying the charge

The basic charge is £8 per day (raised from £5 in July 2005). At the same time as this general price rise, a period discount was introduced giving monthly payers the equivalent of 3 uncharged days, and annual payers (252 consecutive charging days) 40 uncharged days (TfL 2004a); this discount is designed to take into account events such as holidays and days working out of London. Residents of the zone and of a few small areas near the edge of the zone can benefit from a 90% reduction, but, to do so, they need to purchase a minimum of five consecutive days' charge.

At the time this research was conducted, the charge normally had to be paid by midnight on the day of travel or up to 65 days previously (TfL 2004a; TfL 2005g). Failure to pay the charge by the deadline results in the issuing of a Penalty Charge Notice (PCN). Currently the Penalty Charge is £100 but this is reduced to £50 if paid within 14 days (TfL 2005b).

The charge can be paid (TfL 2003c)

- by post (a very small number of actual payments);
- online;
- in person at selected newsagents, at retail outlets with PayPoint, some petrol stations, and TfL information centres;
- using self-service machines in car parks;
- by phone to a call centre; and
- by SMS text message from a mobile phone, which requires pre-registration (part of "Fast Track").

There are around 95 000 payments of the charge per day, and around 6 000 Penalty Charge Notices (PCNs) issued daily; this is a fall from around 8 000 PCNs per day in March 2004.

6.1.2 The case study

As with the other studies, the data included interviews and documentation:

- semi-structured interviews with 14 ordinary users of the service,
- interviews with staff of the service provider and with groups working around the charge, and
- over 60 documents such as minutes of meetings, policy papers, leaflets produced for charge-payers, and press releases.
- In addition, for this study, 90 charge-payers were interviewed using a standard interview[5].

Perhaps because of the high profile sensitivity of the CLCC, it was only possible to interview one senior manager within TfL's operations; on the other hand, interviews with transport advocacy groups and with interviews with the operators of high-profile websites for and against the CLCC provided a wide range of informed viewpoints.

A standard interview was used to collect data between mid-January and mid-February 2005. The interview schedule contained category questions on frequency of payment and most used payment methods, and more open questions. 52 of these interviews were voice recorded by the interviewers; 38 questionnaire forms were collected by the students without making recordings. The profile of these responses is detailed in Appendix D. The interview and response form were designed along the lines suggested by Oppenheim (1992).

The collection of data from the standard interview was followed by 14 semi-structured interviews from a mixed sample including drivers and non-drivers, 5 female and 9 male, in three phases: February/early March 2005; five neighbours living near the edge of the zone in March 2005; later interviews in December 2005/January 2006, after the rise to £8 and the introduction of annual accounts.

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[5] Much of this data was collected by undergraduate students as part of a final year project, and the author would like to express his gratitude to them. These interviews are identified as Student II:..

The total length of the student-gathered recordings was 340 minutes and the average length of the depth interviews was 35 minutes with a maximum of 56 minutes (deliberately kept under one hour).

6.1.3 Data Analysis

As in the other studies, analysis of users' interviews consisted of an iterative process of coding preparatory to Discourse Analysis; this coding emerged from the data rather than from a pre-defined coding frame, following areas of interest. Atlas TI was used to assist in this stage (Scientific Software Development 2005). This outline coding frame and examples of analysis are in Appendix D.

The code "families" (note that these families group related codings into phenomena but not in the theoretical coding sense of Grounded Theory; there are no claims towards causality or correlation in these codings) group common themes and are themselves the basis for further analysis (Appendix D.2.i). They are somewhat different in their aims:

- *Antagonism* and *Privacy* and *Fairness* belong together in the sense of people expressing a challenge to their personal desires or beliefs;
- A related code concerns payers' *Enchantment* or dis-enchantment in *Felt life* with the transport system as a whole;
- A large code family of mundane *Contingencies* is similar to the "lived life" code group used in the Oyster case study;
- Because the wider aim of the CLCC is to discourage car use, there was a particular interest in people's *Changed driving patterns* and *Public transport use*;
- From an HCI point of view, the interviews were coded for the *Payment methods*;
- Various form of *Avoidance* are part of a specific analysis in section 6.3.3;
- Finally, this study explicitly identifies some interesting *Stories*. Although there is not space here to present any of these stories in full, they provide a sense of *livedness* to the study. An example is an interviewee who told a

story of finding a new car-park just outside the zone, offering a service of monthly rental.

For the student-collected interviews, the coding was somewhat simpler, reflecting the much more standardised interview. There were the same basic categorisations, and the same "non-categorising" categories such as whether the driver perceives that they have changed their driving patterns, with a special analysis of those who express a non-changed driving pattern, and also their preferred payment methods.

Documents were not discourse-analysed in the same way, but were carefully interpreted for explicit and implicit mentions of usability and for policy design which might have usability implications; key documents in this sense include minutes of meetings of TfL and the GLA transport committee, which are available verbatim from TfL. Some 62 documents were analysed in this way.

6.2 Affordances for interaction in the CLCC

Following the pattern of the previous chapter, this section draws on the different *affordances* of the various payment channels and considers their *genres* to understand the ways in which SMS and other payment channels do, or do not, interleave with people's everyday lives.

6.2.1 Electronic licences in the CLCC

The existing London scheme is a *licence* scheme (TfL 2004g); that is, road users must purchase, in advance or on the day, a licence to use the roads within the charging zone. A licence scheme presents a need for interactions in the purchase of the daily licence or for "bulk" purchases for consecutive charging days. This contrasts with a billing scheme; the onus is on the road user to ensure payment, or risk a Penalty Charge (LTUC 2005).

Although payment of the CLCC is a *licence* in legal terms, usually no physical (paper) licence is issued; the "real" licence is a database entry stored on a remote server, inaccessible to the payer, to which the web page, or call centre, is an indirect interface.

The same consideration applies to payment using SMS, but in that case, successful SMS payment is acknowledged by a return message from the TfL server. This is not

immediate, but has a delay of up to 30 minutes; there is separation in time as well as space, compared with the immediacy afforded by an online connection.

It is, however, possible to obtain a paper document which approaches more closely to the traditional, legal, paper medium of a licence; this is by paying the charge in a shop.

6.2.2 Marking the boundaries of the zone

The system is enforced, in the first instance, by 688 ANPR cameras at 203 sites, supplemented by 10 mobile patrol units and 64 monitoring sites. As an interface, these cameras are not exactly invisible (see Figure 17 below), but do not provide any physical barrier or perceptible, visible or audible visible warning that the boundary of the zone has been crossed.

It is easy to envisage technical implementations which could inform a user that they are about to enter the charging zone, although with current technologies accuracy is insufficient to do so reliably (TfL 2005h). However, simple physical systems of signage and other non-technical approaches may be more appropriate.

The geographical boundary is well indicated; the marking of boundaries is reflected here, as in the other case studies, using explicit signs which have been carefully developed into conventions, drawing on existing *genres* (additions to existing road-signs, signs painted on the road surface, reminders throughout the zone), and in turn develop into new and recognisable genres. Whatever people's opinion and experiences with the CLCC as a whole, there is widespread agreement that the road markings and signs that indicate the boundaries of the zone are clear.

The existing scheme is simple, with one level of charge (allowing for period and fleet discounts) and one zone. There is a similar simplicity in the times at which the charge is operational. For example, it has been suggested that the charge should be limited to mornings in order to mitigate the supposed damage to businesses from the charge; but the existing scheme has one, single charging period on charging days.

Left: "C" sign painted on a side-road; right: traffic taking the left turn will enter the zone

Figure 16: Marking the boundaries of the zone.

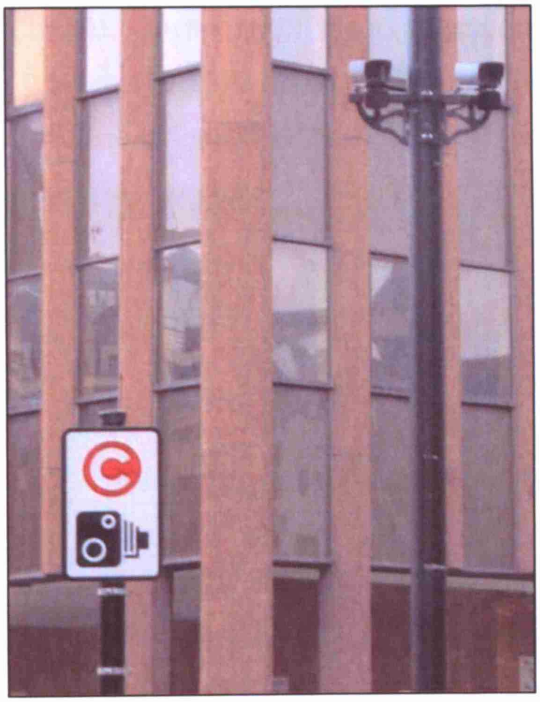

Figure 17: ANPR cameras at entrance to the zone

6.2.3 Affordances of mobile payment

Although primarily used for one-to-one personal communication, a number of recent developments make use of SMS text for small payments (Mallat, Rossi, & Tuunianen 2004) and other standard interactions with computers (for example, Google SMS (Schusteritsch, Rao, & Rodden 2005)). Since they are so new, research into these uses of SMS is only now emerging, but suggests that even people who use SMS for personal communications are not comfortable with making payments this

way, other than perhaps for phone-related products such as ring tones (Kristoffersen, Synstad, & Sørli 2006).

One possible model for SMS payments uses premium messages billed through the mobile service provider. However, this is not the method used for payment of the CLCC; instead, a formatted message containing part of the credit/debit card number, and possibly the car registration number, is sent to a normal rate number, and this special message is the instruction to the system to pay the charge.

This leads to a second related factor deterring payment using SMS: the requirement for pre-registration. Registration can be done online or by the call centre; it cannot, however, be done using SMS. It is well-known as a general principle of e-commerce that unnecessary registration should be avoided (for example, Nielsen, Farrell, Snyder, and Molich (2000)). On the other hand, registration has advantages for frequent CLCC payers, overcoming the need to send credit/debit card information over SMS, and so being both simpler and more secure for those charge-payers.

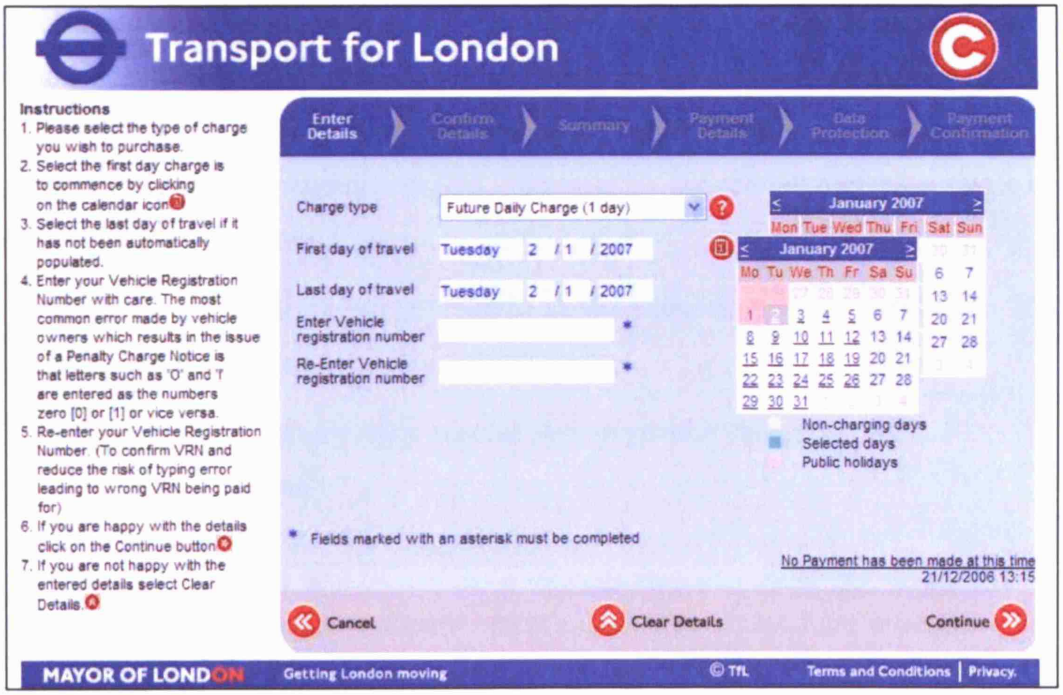

Figure 18: Payment of CLCC on the website for a future date

6.3 *Lived experiences of the CLCC*

As in the other case studies, this core section of the chapter provides perspectives on information systems as they integrate into everyday life. It starts by looking at the ways in which daily contingencies constrain possibilities for payment as well as

choice of transport mode; this is then amplified as *experience* in the lives of charge-payers and other Londoners.

6.3.1 The process of payment is not the problem

A clear finding is that, for most of the interviewees, the actual process of payment is not considered to be problematic[6]; this concurs with TfL's own findings that 80% of payers are satisfied with their preferred payment method (TfL 2005a). This not to say that payers have not found *other* payment channels problematic, but that the choice of payment channels, principally SMS, online, or in a shop, seems to be sufficient to the extent that most payers do not find their *preferred* channel to be problematic.

Usability issues, then, are not in the payment process itself but in the context that surrounds it; the contingencies which determine transport use, issues such as perceptions of fairness, and of uncertainty about the time and geographical boundaries of the zone.

The choice of payment channel for the CLCC is related to daily contingencies. For example, a less frequent traveller might not make the effort to register for *Fast Track* payment; someone who uses different credit cards for work and personal purposes might be constrained in SMS payment by the need to register a single card against the mobile number.

As a payment channel, paying at a shop "*matches the users' world*" (Nielsen 2005) for some people who are visiting central London:

> I: So, how do you normally pay for the congestion charge, is that ...
>
> At a retailer, mainly
>
> I: Ok, why do you use this method?
>
> Um, I just prefer it, makes it easy, because there's, when you come into central London you park, there's normally somewhere around that you can do it, and, you know, you just take out £5 from your wallet to pay, it works out simply - Student III.1:35

As will be shown later, the need to meet the payment deadline is an aspect of the CLCC which most pressurises charge-payers, so lack of a suitable payment channel and payment scheme, as the deadline for payment approaches, is one of the

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[6] The exception is the car-park self-service machines, which could form the basis of a further study; however, this is a minority usage.

circumstances which lead to antagonism on the part of charge-payers. On the other hand, block payments, which might overcome this problem, do not reflect daily realities:

> I don't want to be dealing with it ahead of time, cos I don't know whether I'm really going, you know, something else might change, plans might change, and then I've ended up spending money that I'm not going to use ... but then, doing it after, you're just so, it's just so easy to forget about it - II13:202

6.3.2 Uncertainty in virtual transactions

Some payers expressed a preference for a physical proof to overcome the uncertainties of electronic payment. It was noted in section 6.2.1 that payment at a shop provides a printed receipt. A charge-payer recounts another method, printing a confirmation of a web transaction:

> I always print out a copy of the receipt, just in case, and I email it to myself and make a note in my diary (laugh), well, because there were so many problems initially – II 3:43

The lack of direct access to the remote server raises an element of uncertainty; it is emotional but also shows subtle sense-making. Lack of tangible proof of payment and also presents a practical problem for those who need a paper receipt, for example for making an expenses claim.

This uncertainty is partially overcome by storing an electronic copy of the receipt returned by the server, but the electronic form remains mutable and potentially destructible. To feel fully certain, a paper copy is needed; but, although this is tangible and relatively immutable, this is not the real licence, but a *representation* of the licence held on the server.

6.3.3 Staying beyond the boundaries

Some drivers continue to drive in the zone during the charging times, but others avoid this by driving round it, or by avoiding the charging times.

These are boundary issues; the geographical and time boundaries mark social boundaries at the limit of the drivers' free and chargeable time and space, and are therefore spaces of tension, but also of negotiation as drivers avoid, or accept, the charging zone and times:

> I was coming back through north London a couple of months back, and, er, it was something like twenty-five past six, and I was

> approaching Euston [near the northern boundary of the zone], and I parked up for five minutes, well, because ... I was outside, just outside, and then when I drove through, I thought, well, if my watch is wrong, it's wrong, you know, but I didn't hear anything, so I suppose [it was alright] - II7:14

Recall from section 6.2.2 that the *geographical* boundary is clearly indicated with special signs. Interviewees nearly always knew whether they were in the zone, although there were uncertainties such as those around occasions when an accident, for example, forced drivers to enter the zone unwillingly, or where one side of a one-way system touches the edge of the zone.

However, the *time* boundary is not signalled; there are no clocks or warnings to inform the driver when the charge is in force. The charge-payer in this text sample accepted the small inconvenience of "parking up" for a few minutes in order to avoid having to pay the charge. A more cautious person could have paid the charge as a precaution, or waited a few more minutes in order to be certain that the charging period had ended, but it seems in this case that the driver preferred to accept the risk of a Penalty Charge.

6.3.4 Fairness in enforcement: forgetting to pay

Unlike some other financial liabilities, payment of the CLCC has a strict and restricted time deadline. In this, it resembles the payment of transport fares, but, unlike fares, there are no physical barriers and no warning signs in the *payment* location to act as reminders (although there are clear indications when *driving into* the zone, and publicity campaigns from time to time with displays in public places). But payment of the CLCC is only part of daily experience and is peripheral to peoples' ordinary awareness; it is "not at the top of their mind":

> you get home at nine-thirty, you've got half an hour to pay it, but you come in .. I mean, sometimes people have been here, or something like that, you think, you know, you're not, it's not on top of my mind, really, . and so you speak to the people and so on, and then, you know, eleven o'clock, you think, "oh, hell, I've got to pay ten quid", but the worst one comes when you forget altogether, 'cos you've relaxed and had a glass of wine, or something (laugh), it's often happened, and then it's forty quid - II8:209

The analysis of the interviews in terms of emotion merged at this point with the coding around *forgetting to pay*, or making a mistake in paying. It is the large penalty charge levied on those who fail to pay correctly and on time which is

perceived as being the most unfair aspect of the scheme, and which leads in some cases to antagonism against the charge as a whole.

This charge-payer paid every day, but on one occasion there was a mistake in payment resulting in a Penalty Charge:

> I thought it was unfair, in that they, I didn't write to them, or anything, but just, it was unfair in the fact that if somebody like me, was known to be a regular, if you looked in your database, you would seen that I've paid for two years, or whatever, it'd been in every day, ... I was there paying my Congestion Charge, and suddenly I hadn't paid it, you would think, "hang on, somebody's slipped up here", you know - II14:615

The unfairness this payer feels is enough to consider writing a letter of complaint (though not enough to impel him to actually do so), and clearly is still felt some months later when this interview was made.

6.3.5 Changing driving behaviour: discourses of acceptance and resistance

An analysis of the student-gathered interviews suggests that the charge might be having the intended effect in terms of discouraging driving in the zones; only 24 of these 90 respondents said that there had been *no* change in their driving, and, of these, 6 are infrequent drivers (less than once a week).

At a deeper, motivational level, analysis of the discourses of drivers who said that they have not changed their behaviour, and a comparison with those who say that they have changed, suggests that a number of different discourses are drawn on by interviewees.

Among drivers who have not changed their driving patterns, there are those who drive in the zone infrequently but define their occasional car use as necessary or justifiable, a discourse of "*occasionally have no choice*":

> Well, I normally, when I go to my office in central London, I always take the Tube, it's only on the occasions when I'm driving back from my head office [in Bristol], that it's not worth coming out [home] to drop the car and then take the Tube back - Student II8.2:43

A second set of discourses is of people who drive frequently in the zone, but would avoid it if they could. According to these discourses, it is the contingencies of daily life which define the use of particular transport modes:

> often we go on the train, now, cos if we don't have to take materials .. but the problem is you can't really avoid .. if it's more meetings, we'll go by train, but if, um, if it's, we've got to take stuff to a site, on a job, we have to use our vehicles - Student I114.11:14

Both of these sets of discourses are low tension, in the sense that they do not express antagonism towards the charge. There is, however, a set of discourses of drivers who are *resistant* to change; sometimes, this is related to a negative view of public transport as an alternative to driving; in other text samples it is driving which is given a positive construction, or they simply "*don't really have an option*":

> Er, well it hasn't changed ... It's angered me somewhat
>
> ... I don't really have an option. I've gotta travel there for work, um, I have to pay the charge now because otherwise Mr. Livingstone will send me nasty letters - Student I17.19:14

In considering transport use, the interviews throw light on the ways in which completely ordinary daily contingencies determine choice of transport mode. Practical considerations such as having to carry luggage or work tools, having to drop someone off or collect them, or medical conditions such as a bad back, were given as reasons for preferring to drive in central London and therefore to pay the charge. Yet these contingencies are mingled with more emotional discourses around the difficult choices sometimes faced when a perceived need encounters the harsh reality of "*nasty letters*" and the obligations and enforcement of the CLCC.

6.3.6 Affordances, experience, and antagonism in the CLCC

The match or mis-match between the CLCC and the contingences of life is also interwoven with the *affordances* of mundane interactions. These affordances were considered in practical terms in section 6.2; this section amplifies the implications for the experiences of charge-payers.

In particular, SMS payment has shortcomings in its affordances (since it does not provide immediate feedback and requires pre-registration), and is perceived by some to be an inappropriate *genre* for payment. These breakdowns in affordances and genre compromise the potential of this channel to overcome problems such as the perceived unfairness of daily payments enforced by a large Penalty Charge; without prior registration, it is not suitable for last-minute, unplanned payments.

But other physical artefacts of the CLCC also arouse different emotional responses. One interviewee even has an almost friendly relationship with the cameras, which recalls Turkle's (1996) description of children interacting with computers almost as another human, while retaining a clear awareness that it is non-human:

> I enter the charging zone ... and you've got the cameras up there, so I do a mental wave every morning "hello, I've paid! coo!" - I13:283

Another interviewee has a quite different relationship with the cameras which enforce the complex time rules for bus lanes:

> I don't know who works these things out, but it's like a taunt, isn't it, got little cameras, and it's all lovely and empty, and there's queues of cars – I17:141

As this driver has constructed the discourse, there is a sense of "others", policy-makers and implementers who are deliberately taunting the motorist. The cameras are the visible sign of the unseen "others"; the bus lanes are "*lovely and empty*", but for the unfortunate driver there are queues, possibly as a direct result. There are no "mental waves" in this narrative, but instead there is antagonism.

6.4 Analysis: usability and policy in the CLCC

The need to pay the charge contrasting with the likelihood of forgetting, breakdowns in the affordance ecology and the ways in which people overcome them, and the inflexibility of payment systems, give rise to experiences in the lives of charge-payers. These experiences, though, are related to public policy design, both following from policy and in turn constraining the achievement of policy aims, as this section analyses.

6.4.1 Users' experiences: bearing the responsibility

Responsibility for daily payment of the CLCC is borne by the individual charge-payer. That is, apart from schemes for car fleets and commercial vehicles, there is currently no system for automated payment such as a pre-paid account scheme or automatic deduction from an on-board unit.

It is in considering automated payments that the significance of the London scheme as a *licence* scheme becomes apparent; this is not a billing scheme; it requires some action on the part of the payer in order to make the payment, and this is enforced by penalties. There is a spectrum of possibilities for options which could reduce the need for user action; for example, a licence scheme could be enforced electronically

by a tag on the vehicle (Government Office for London, 2000), or by more advanced ANPR.

6.4.2 Social inclusion in the CLCC

Payment methods also have implications for social inclusion; research by the Commission for Integrated Transport (Commission for Integrated Transport 2003) showed, recalling an issue in the payment for the Oystercard, that electronic payment systems of the CLCC scheme rely on pre-requisites such as a bank account, credit/debit card, and access to the internet or a mobile phone. Cash payment at retail outlets is possible but, for some, less convenient. However, although electronic channels are cheaper to operate and are encouraged, TfL is well aware of the need to continue to provide cash payment channels, and also to cater for the needs of visitors to London (TfL 2005g).

One of the concerns prior to the introduction of the CLCC was that it would be particularly problematic for low-paid workers in particular industries who need to travel within the zone at times when public transport is difficult. The CfIT research suggests that, although this is an issue for a small number of workers, there are mitigating factors which reduce the impact. Many of the lowest paid are living in hostels provided by an employer, or are family members living on, or near, the premises; others have developed strategies to avoid the charge, including driving to the edge of the zone and walking or taking public transport; car ownership is in any case lower than average amongst low-paid workers. Some have changed jobs. However, there has also been a switch by such workers from car to public transport, mainly bus; there is an adequate 24-hour bus service.

Finally, automated payment schemes also raise issues of inclusiveness; existing detection and payment methods would need to continue to be available for infrequent drivers, visitors to London, or for those who prefer to pay in cash rather than electronically (TfL 2005g).

6.4.3 The appropriateness of payment channels of the CLCC

Recalling an observation of Dewey (1929) that ends are often the means towards a larger end, payment of the CLCC is the end purpose of the systems of payment, but

it is only part of charge-payers' larger intent: to get to their destination, where their journey itself is only part of their wider lived experience.

The CLCC is peripheral to people's everyday experience; indeed it is this property of being in the background of mundane life which gives rise to the likelihood of forgetting and the sense of unfairness which follows, as discussed in section 6.3.4. As in the case of the Oystercard, though, as the inseparable means towards a larger end, the affordances of the CLCC, particularly with regard to payment, sometimes *come forward* into the awareness of charge-payers, as breakdowns or as the risk of breakdowns, for example as PCNs.

Because the CLCC is not a physical licence but only the representation of an entry in a database, there is a separation in space between information and its storage (Gaver 1996). This recalls a similar observation in the Oystercard study; but the details are rather different: the uncertainty is not around remaining value stored, but whether a necessary payment has been made. Breakdown leads not to the immediate inability to make a journey, but to a longer-term financial dis-benefit in the form of a Penalty Charge.

Charge-payers receive visible and sometimes also tangible confirmation of payment, (section 6.2.1). Some charge-payers felt the need for the kind of certainty and predictability which paper provides (Gaver 1996). Conversely, there is a feeling of uncertainty in the mutability of electronic systems, the loss of concreteness in virtual transactions observed by Zuboff (1988).

To provide for their felt need for physical representation of virtual payments, some charge-payers choose to pay in a shop, but the payer quoted in section 6.3.2 above as storing and printing confirmations of payment was responding to this need in a different way, by printing a confirmation message. This is an *ad-hoc* practice, of the kind which Button and Harper (1993) have shown in a manufacturing context. Taking concrete objects which are to hand and using them without pre-planning or a deep theoretical analysis is "*bricolage*" (Lévi-Strauss 1966), a concept presented in section 2.3.5. Although in this example there are only a few artefacts (computer, email, printer, paper) and their use is quite simple, they contrast with the careful design of an engineered system, adapting it in ways which the designers did not predict, or even consider necessary, to fit their particular, immediate needs.

6.4.4 Antagonism and practical reason

Section 6.3.5 presented an analysis of discourses around changed driving practices following the introduction of the CLCC. Some of these discourses are said to be antagonistic; antagonism cannot exist in a single person, but must be social, since antagonism is essentially a relation between a *self* and an *other*. Laclau and Mouffe (2002) have developed the concept of antagonism as a situation in which the presence of the "*Other*" prevents one from being fully oneself; a would-be driver is prevented from being a driver, or can only be so on payment of the charge.

In Bakhtin's more emotional-volitional terms, the self is changed in a dialogical relationship with the "other"; the driver does or does not change his or her driving practice, but these relationships are clearly emotional as well as emotive. The relationships are also personal; although mediated by policy and by a system of technological artefacts, the last-quoted interviewee understands the underlying human and inter-personal dialogue with "*Mr. Livingstone*".

But other relationships are with impersonal "others"; the contingencies and unpredictability of daily life meet what Zouridis and Thaens (2003:175) call the "*administrative-technical processes*" of e-government. Recalling again the Weberian idea from section 3.2.4, there is no "street-level" bureaucrat with the freedom to overrule the automated process of issuing a Penalty Charge. Nobody is in a position to think "*hang on*", as the speaker in section 6.3.4 (II14) expressed it; indeed this kind of human thinking is not involved at any stage. This has implications for democratic guarantees, as Zouridis and Thaens (2003) point out; but for the charge-payer it also has emotional and volitional impact, and a deep sense of unfairness.

6.4.5 Felt experiences with the Central London Congestion Charge

In the terms of the pragmatist philosophers, these experiences hold the possibility of being *aesthetic* (Dewey 1934), or may fail to be so. Just as the experience of buying books online (McCarthy & Wright 2003) has both a practical, extrinsic meaning and intrinsic meaning in exploring the labyrinthine worlds on online bookstores, so payment of the CLCC is both a simple routine necessity and an occasioning of (mostly negative) feelings.

It might seem trivial that people would be annoyed at forgetting to pay and incurring a large fine, but, as considered in section 2.4.2 in chapter 2, the point is that these feelings are not "*separate from the situation*" (McCarthy & Wright 2004:15); on the contrary, they are directly related to it, and related, too, as many interviewees have realised, to the basic design of the payment system. Emotions are not "objectless", but attached to objects and events (Dewey 1934).

Some of these negative feelings are in terms of the challenge to deep-held beliefs about the right, or perhaps the need, to drive on public roads, the anxiety of having to remember to pay, and the unease of being unsure whether the payment has succeeded. Sometimes this is explicit, as for example the anger some people feel about the CLCC or their disgust at the idea of travelling on public transport.

But there are more complex emotions constructed on the basis of understandings of the system and its place in people's lives, for example the grievances some people feel about being fined if they forget to pay or at the difficulties of undoing mistakes in payment. Emotion is both sensory *and* intellectual, so that focussing on felt-life also throws new light on *cognitive* processes (Hicks 1996; McCarthy & Wright 2005a).

The discourses around the CLCC, even the most antagonistic, are clearly part of the sense-making about the experience of travelling in London and dealing with the CLCC; these are not raw animal urges (McCarthy & Wright 2004). The narratives of the drivers in section 6.3.4 show this working out particularly clearly; the narrators recount inner, novel-like voices to tell a story and at the same time to work out both for themselves and for others the sense and meaning of the events.

6.4.6 Embodiment and the burden of payment

If the Oystercard and Journey Planner website are technological artefacts *through* which an action is achieved (Ihde 1979) and in this sense *embodied*, then experiences with the CLCC, by contrast, are less embodied. Cameras are encountered in passing and usually without any awareness; signs on the road are certainly visible but are not physical barriers; time boundaries are not signalled. From an HCI point of view, the "user" encounters interfaces for which the affordances suffer from a "*lack of feedback*", in Norman's (1988) terms.

The would-be charge-payer may even not be consciously aware of the need to pay; in the extreme, the system might first enter their experience in the form of the distinctly non-virtual arrival by post of a PCN.

However, the experience, if it can be called that, although only in the background of the person's awareness, cannot be ignored by the charge-payer. The experience must be recalled, and this recollection must be within a limited timeframe; failure to do so will be "punished". The CLCC places a *burden* on the user to remember to pay, enforced by Penalty Charges.

6.5 Policy as dialogue in the CLCC

In comparison with the other cases studied in this thesis, the policy aims of the Central London Congestion Charging Scheme are few, and clearly stated. There are inevitable tensions over the use of road space in central London; traffic reduction does not simply reduce car traffic, but frees road space for cyclists, pedestrians, and buses (LTUC 2005).

Since the days of the Smeed report (1964), the possibilities for road pricing have been the subject of public debate. This is reflected in the policy discussions and continuing changes, which in turn are felt in the lived experiences of transport users and drivers in London.

These discussions, most recently the debate (and ultimately policy change) about "*Pay-next-day*" (section 6.5.3 below), indicate the centrality, whether explicit or not, of usability concerns in discourses around payment of the CLCC. So it would be too simple to say that usability and the wider user experience are not a consideration of policy making; but the point is to ensure that they are explicitly addressed, with input from usability professionals and a viewpoint informed by the understanding of experience that is developed in this thesis, at all stages of development.

6.5.1 Usability as a policy consideration

The Smeed report (1964) suggested a set of guidelines which, although not specifically labelled as usability, include considerations such as that "*prices should be stable and readily ascertainable by road users before they embark upon a journey*" and "*payment in advance should be possible, although credit facilities may also be permissible*" (Smeed 1964:4-5), and suggested an early form of tag-and-beacon, with post-payment simply by cheque.

However, usability of the payment system does not appear to have been a priority for the RoCOL report, only that a scheme should be "*feasible, effective ... and acceptable - in terms of support for its introduction and ... compliance by the public*" (Government Office for London 2000:Chapter 3).

This lack was noticed by the GLA, and in public debates of GLA committees; for example, the importance of getting the collection and enforcement right, although again not expressed specifically in usability terms, was raised in a scrutiny report in November, 2000:

> It seems that TfL see the implementation of the total scheme as largely an engineering project. ... However, the core of the total scheme is essentially an IT project ... designing and implementing the charging and enforcement elements of the scheme is a significant project in its own right. - (GLA 2000:3.10)

Even before initial introduction of the charge, usability implications were acknowledged; for example in the extension to the deadline for standard-cost payment, and the introduction of SMS payments in addition to other channels (GLA 2003; TfL 2001).

6.5.2 Politicians' discourses: the hassle factor

For the politicians, there is much discussion around the extent to which usability issues around payment of the CLCC, summed up by the construction of the "*hassle factor*", are leading to, or should lead to, changed travel habits since the introduction of the charge.

For Steve Norris, the Conservative candidate in the 2004 mayoral election, the "*hassle factor*" is

> a key reason why people are now staying away from central London ... not the actual level of the charge" - (Conservative 2004)

However, the Mayor of London, Ken Livingstone, strongly refutes suggestions that the "*hassle factor*" is part of the basis for the way the CLCC works:

> I have a strong and moral aversion to having an aspect of public policy work on the basis that you make it unnecessarily difficult. ... you are more likely to make it difficult for the people who have limited literacy and numeracy skills - (Livingstone speaking to GLA Transport Committee 2005)

Indeed a promise to reduce the "*hassle factor*" was one of the key points of Livingstone's manifesto for re-election in 2004, which made two specific, *technology-dependent* promises:

> We will make the congestion charging scheme more user friendly by introducing technology that allows drivers to opt for their account to be automatically debited when they drive in the central London congestion charging zone. We will also introduce block pre-payment methods generating automatic reminders when further payments are needed. (The Labour Party 2004)

However, as section 6.5.6 below examines further, timescale, cost, and other competing pressures, as well as the scale of implementation, are constraints on technological change. The promises of the Labour manifesto have been partly fulfilled by discounted block payment schemes, introduced in July, 2005, but the other technological possibilities suggested by Livingstone have not so far been implemented.

6.5.3 Policy change: pay-next-day

The policy discussions around the "*hassle factor*" recall the question of the payment deadline, an issue which was raised by several interviewees, but is not unproblematic at the level of usability; as a senior TfL manager for the congestion charging scheme pointed out (TfL 2005g), the option of paying retrospectively adds an extra complexity for the payer.

The Mayor of London in February, 2005, followed this line:

> *The Mayor:* I told you genuinely... This is only anyone's opinion because we cannot know. If we were to say you have to midnight the second day to pay, my guess is – and we are all just guessing here – is that more people would make a mistake ... There is no technical reason why we could not amend the scheme to do that.- (Livingstone speaking to GLA Transport Committee 2005).

But by September 2005, TfL had changed its mind, and recommended "*Pay-next-day*" as part of the changes around the extension of the zone into parts of west London (GLA Transport Committee 2005; TfL 2005j). Contradicting earlier policy, payers can, from 19th June 2006, pay the charge[7] up to midnight on the day after travelling; not at shops or by SMS, but by phone or online (TfL 2005d; TfL 2006e).

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7 With a small premium, which takes the charge to £10.00 from £8.00, as was previously the case with payments after 10:00pm,

This is an important debate for the *experiences* of charge-payers, since the risk of forgetting to pay on the day is one of the most emotive issues, compounding feelings of the *fairness* of the charge.

6.5.4 Continuing policy change

Partly to overcome the "*hassle factor*", but also to address new policy needs, the payment regime is constantly being re-thought; small and large changes are continually being considered.

Even before the introduction of the CLCC, consultation led to changes in the exemptions and slight changes in the residents' discount area, and the charging time ended at 6:30pm instead of 7:00pm (Banister 2003). The cut-off for payment of the standard charge (without the additional charge for late payment) was originally planned to be 7:00pm (TfL 2001), but by the time of introduction (or at least by October 2003 (TfL 2004h)) this was extended to 10:00pm, and has most recently been extended to midnight on the following day.

The process of making these changes is legally constituted, so that each of these changes is made by means of a *Variation Order* which, following consultation, is confirmed by the Mayor of London as a *Mayoral Approval.* For example, the decision to raise the charge from £5 to £8 daily together with a smaller increase for fleet vehicles was made as the *Greater London (Central Zone) Congestion Charging (Variation No. 5) Order 2004* and approved by the Mayor on 31st March 2005 as MA 2201 (GLA 2005; TfL 2004a).

6.5.5 Breakdowns, intentionality, and policy in the CLCC

The act of payment, to the extent that it interrupts the transparency of a car-driver's door-to-door convenience, is a "*breakdown*", in Flores et al's sense, an "*interruption in the smooth unexamined flow of action*" (Flores et al. 1988:156), which can have positive as well as negative meaning. In Dewey's terms, the question is, is the process of payment part of the *intrinsic* meaning of the task, or is it, to use McCarthy and Wright's metaphor, like having to search in the cupboard for a missing piece of jigsaw puzzle (McCarthy & Wright 2004:145)? According to the assertions of the Mayor of London, difficulties in payment of the charge are not part of its intrinsic meaning; yet it is possible to argue that total transparency may not be the ideal.

From this viewpoint, it is possible to consider that the intentional act of paying on a daily basis may encourage people to think about their car use: in contrast with the need to go to a station, plan the journey, and perhaps buy a ticket when using public transport, with a car "*you jump in the car and shoot off*" (LTUC 2005).

6.5.6 Value rationality and practice in the CLCC

Public policy dialogue to increase usability of the CLCC system occurs in situations of other pressures. There are time pressures; as Banister (2003) notes in the light of legal challenges to the CLCC, it is extremely difficult to implement radical policy within the four-year local government cycle.

The timescale of introduction, the narrow window framed at the earliest by the possibilities of improving public transport and at the latest by the 2004 Mayoral election, has already been remarked upon (section 6.1). Once in place, such a large implementation cannot be easily changed, and, in the case of the CLCC, the central contracts constrain major changes before 2009 (TfL 2005g). As well as time pressures, there are cost implications; for example, implementations designed to improve usability might increase the collection costs and so reduce the funding for improved public transport (TfL 2005g).

These considerations exemplify what Flyvbjerg (2001) calls *value rationality*; it is not possible to understand the decisions made and the paths taken only as *instrumental* (that is., "rational", universal) rationality, but only in terms of the many competing power interests in the specific context of this particular implementation.

Sometimes, links between technological possibilities, policy decisions, and user experience are explicit; for example, the report of trials of new technology considered the need for more accurate vehicle detection associated with account payment (TfL 2005h). Whether explicitly acknowledged or not, these competing political considerations all impact on the experience of the system for charge-payers.

6.6 Conclusions

This chapter reinforces common themes from the other two case studies but adds new perspectives to them. In contrast with Oyster, the CLCC implements new policy which would not have been feasible without electronic technology. In

contrast with the Journey Planner, payment of the CLCC involves a relatively small number of well-established interfaces: the web page, SMS text, phone, and the traditional payment method at a shop (although this is, of course, supported by the electronic payment system).

As a high-profile and sometimes controversial scheme, the CLCC has nevertheless been implemented within a four-year mayoral cycle, and this timetable has itself been constrained by the availability of technical possibilities. The continuing policy dialogue, within specific political and time constraints, is not only an excellent exemplar of value rationality and power, but also of the ways in which policy decisions are felt in the daily lives of citizens.

6.6.1 Usability and policy change

The Mayor of London, in asserting that extending the payment deadline might increase complexity for charge-payers, has understood that the *public policy* question of extending the charging deadline has *usability* implications. Since the initial research for this chapter, non-technical changes which relieve the burden on the charge-payer have been introduced: "*Pay-next-day*", more liberal rules for fleet payments, and discounts for longer period payments.

In a similar way, understanding the usability implications, the discussions around the implementation of the Western Extension Zone recognise the importance of maintaining a single zone. However, there will be some increased complexity because there will be a charge-free route located between the existing and extended parts of the zone.

6.6.2 Usability as a tool of policy

Conversely, usability issues impact on policy; this study has identified a number of breakdowns in the ecology of the payment system, and antagonism arising from forgetting to pay.

Yet breakdowns, not in the sense of making payment un-necessarily difficult but as introducing small interruptions to the daily flow, can be used positively to support policy by influencing transport use, as section 6.5.5 showed. This is so, even though, poor usability can have serious negative impacts on public policy acceptance: a feeling of not being treated with respect, a very negative construction of the motivation behind the CLCC, and antagonism towards the policy-makers.

Certainly, forgetting to pay has given rise to some highly antagonistic discourses on the part of charge-payers, but it remains to be seen whether the new discourses of those who mistakenly "Pay-next-day" for the wrong day are any lower-tension.

The major argument still stands: even though the policy changes over time, it is the *policy* decision which leads directly to a charge-payer's *experience* of feeling anger at forgetting to pay, or frustration at having to rush to pay, or perhaps contentment at the discovery that they now have longer in which to pay.

6.7 Chapter summary

Research contribution	**Contributions of this chapter**	**Mainly in sections**
Interdependency of ends and means	Preferred method of payment is unproblematic	6.3.1
	Transport mode is partly determined by mundane contingencies	6.3.5
	Payment channel determined by contingencies; meeting or failing to meet needs	6.3.1
	Immediate availability of a shop is a convenient way to pay	6.3.1, 6.4.3
	Immediacy of daily life vs. fixity of block payments	6.3.1
	Emotional dilemma between paying unnecessarily or risk a penalty charge	6.3.3
	Significance of licence; imposes action on charge-payer	6.4.1
Charge-payers and others are making meaning in interaction	Understanding ways to avoid the charge	6.3.3
	Inner speech making sense of the world; breakdowns and internal meaning	6.3.4, 6.4.5
	Need for certainty; *bricolage* in finding ways to increase certainty	6.3.2, 6.4.3
	Emotional and rational motives for resisting changed driving practices	6.3.5

Research contribution	Contributions of this chapter	Mainly in sections
	What is "reasonable"; standardisation and inflexibility	6.3.4
	Intrinsic and extrinsic meanings; negative feelings to the charge as a whole; or from specific experiences	6.3.6, 6.4.5
Embodiment; the CLCC as virtual system meets the physical needs of charge-payers, or fails to do so	CLCC is peripheral to everyday life	6.4.3
	Payment is not the focus of drivers' intentionality; leading to forgetting to pay	6.3.4
	Affordances of detection and payment channels; payment channels as genres	6.2.1, 6.2.3
	Affordances at the boundaries; people know the geographical boundaries	6.2.2
	Uncertainty of time boundary	6.3.3
	Dis-embodiment user may even be unaware of driving in zone	6.2.2, 6.6.2
	Contrasting affordances of electronic and traditional payment channels	6.2,1, 6.3.2, 6.4.1
	Affordances of mobile payment: SMS doesn't afford immediate confirmation doesn't feel like a suitable genre.	6.2.3
	Need for pre-registration; negates unplanned use of SMS	6.2.3
	Uncertainty of mutable artefacts	6.3.2
	Emails and print-outs provide feeling of security	6.3.2, 6.4.3
	Embodiedness of payment at a shop	6.2.1, 6.3.1
Antagonism and acceptance	Perceived unfairness around forgetting to pay	6.3.4
	Lack of "street-level" rationality leads to perceived unfairness	6.3.4, 6.4.4

Research contribution	Contributions of this chapter	Mainly in sections
	Antagonism; development of the concept of antagonism and relating it to the CC payment system	6.3.5, 6.4.4
	Friendly or antipathetic relationship in encounters with artefacts	6.3.6
Public policy and experience; policy is unfinalisable, constantly and continually changing	CC payer bears the responsibility; Enforcement vs. payment model, and commensurate anatagonism	6.4.1
	The "hassle factor": payment channels are not the problem; the nuisance of having to make sure to pay	6.3.1, 6.3.4
	But the "hassle factor" is a central discourse of politicians	6.5.2
	Changing behaviour; discourses of accepting change/resisting change	6.3.5, 6.4.4
	Simplicity of CC scheme: one zone, one time, one price (with discounts); hanging policy: pay-next-day	6.2.2, 6.5.3
	Awareness of broad usability implications from early days; continuing realisation by policy-makers	6.5.1
	GLA Act, Variation Orders, and Mayoral Approval: legally-instituted changes	6.5.4
	Act of payment as a "breakdown" in the smoothness of door-to-door convenience	6.5.5
	Value rationality and competing pressures	6.5.6
	Social inclusion/exclusion	6.4.2

Table 6: Summary of contributions of the CLCC case study

Chapter 7

Case study 3: The Transport for London Journey Planner[8]

Travelling on the London transport system requires the service user to *navigate*, that is, not only to find a way from one place to another, but to do so in ways that meet constantly changing contingent needs. Good-quality information which supports these requirements can increase travellers' confidence in using the system; this could encourage public transport use in general, and specifically promote the use of more sustainable modes of transport. The questions which this chapter asks, therefore, are

- how do people navigate around the London transport system?
- how does the navigability of the transport system fit with other aspects of their lived experience?
- what aspects of policy design have positive or negative impacts on this navigability?
- how does the navigability of the London transport system support the policy aims of Transport for London?

Navigation and the ways people find their way in unfamiliar situation have been a focus of several seminal contributions to studies of *intelligence*, and of *cognition* (Gladwin 1964; Hutchins 1995; Suchman 1987). For example, Gladwin worked with Trukese Islanders using navigational concepts quite different from the plans used by "European" navigators. Systems in support of information for transport users were also at the heart of the co-operative work studied by Heath and Luff (1992) in the context of London Underground; artefacts and their often unnoticed properties provide crucial mediation for collaborative activity.

But this understanding of artefacts and social interaction needs to be tempered by two considerations:

1. Artefacts are not all equal; they have properties which may or may not be desirable in terms of their cognitive affordance; and

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[8] The author wishes to acknowledge the assistance of Fikri Kiourt, an MScCS student, in this research

2. cognition needs to be considered along with the emotional and volitional aspects of experience.

In this chapter these understandings are explored in the context of the TfL Journey Planner, drawing first on genre theory and an analysis of affordances, and then on experience as related in the narratives of service users.

7.1 The TfL Journey Planner

The Transport for London Journey Planner (JP) is an interactive information system available through a web interface from the TfL website, from BT and iPlus kiosks (Cityspace 2006) at stations and on-street, Sky Active TV, and on mobile phones using WAP or SMS.

It is similar to a number of other national and regional Journey Planners (for example, Transport Direct (2006)); according to Lyons (2002), citing Austin (1999) there were over 400 transport information websites in UK in 1999. Like a number of similar Journey Planners, it is based on an engine from Mentz Datenverarbeitung GmBH[9] (2006), but the front-end and data is specific to TfL; maintenance of the system, or emergency changes such as on the day of the July, 2005 bombings in London, requires joint working by TfL and its suppliers (TfL 2006c).

The TfL Journey Planner is only one of a number of information resources for travellers in London. TfL have defined six "*Information Touchpoints*":

- the information available at the Travel Information Call Centre;
- Travel Information Centres at mainline stations and Heathrow Airport;
- staff at stations, bus stations, and DLR terminals;
- information available through the TfL website;
- through the mobile portal; and
- on interactive television (TfL 2005i).

However, this ignores traditional information sources such as notices at stations, information on bus-stops, and printed maps, including the TfL Tube map; and electronic services such as email and SMS warnings of problems on a route.

[9] http://www.mentzdv.de/www/, Last retrieved: 14/12/2006

7.1.1 Aims of the TfL Journey Planner

Information provision by TfL aims to encourage the use of sustainable transport modes and discourage personal car use; and to provide "*socially inclusive empowerment of our customers through accurate and clear information*" (TfL 2005i). Consequently, sustainable modes are preferred in information for travellers, and their awareness is increased of public transport, walking, and cycling options. Information can also spread the load on the system by encouraging travellers to use alternatives to congested or disrupted routes (GLA 2001e; TfL 2006c).

In addition, national policy, as part of the Assist Intelligent Transport Systems project, explicitly addresses the issue of public confidence in public transport through the use of real-time information (DfT 2003).

7.1.2 The case study

The data sources for the study consisted of

- interviews with 19 individual transport users with an average duration of approximately 40 minutes
- 4 focus groups with a total of 15 participants and an average duration of 54 minutes
- task-oriented, laboratory-based recorded observations of 11 people with a range of prior experience of JP use
- a situated observation at a busy Underground station
- an interview with the manager of a Travel Information Centre
- interviews with a senior manager in Marketing Operations and with a Marketing Planner, TfL
- Analysis of the main interfaces of the JP (web, PDA, mobile)
- Analysis of documents specifically relating to travel information and relevant sections of documents on transport policy

7.1.3 Observations

The eleven scenario-based observations were recorded using Camtasia Studio (TechSmith 2005), which records everything that happens on the screen, showing mouse movements and clicks as well as recording audio from an attached microphone. Participants were asked to "think aloud" and their reasoning, as they expressed it, is captured in these voice recordings. The scenarios were designed to

be fairly open, non-prescriptive at the task level, and were devised following some ten hours of desk-based online analysis of the system.

Scenarios were designed according to the following criteria:

- sufficiently open to allow participants to use their own preferred search methods;
- having at least one possible solution in terms of transport route, but challenging in some ways, involving the participants in problem-solving;
- participants would draw on personal knowledge at some points but would almost certainly not be familiar with all of the routes and locations involved.

The scenarios were read out to the participants, but they were also able to read them for themselves. These scenarios, with annotations, are attached in **Appendix E**.

In order to strike a balance between the need to research the JP and the interest in the ways that people use information resources, no guidance was given about the use or non-use of other information.

7.1.4 Data analysis

The interviewees and focus group attendees were recruited on the basis that they had at least some experience with the TfL Journey Planner, but the frequency of use varied from "*hundreds of times*" to very little prior use. As in the other case studies, the interviews and focus groups were voice-recorded and transcribed, and analysed using Atlas TI (Scientific Software Development 2005). Initially, the data was coded, and these codes were used to locate "key" quotes around core themes, for more in-depth Discourse Analysis (Potter & Wetherell 1987).

The analysis is detailed in Appendix E.2.ii. In summary, as well as basic "non-categorical categories" such as people's general familiarity with London, the interview and focus group data was analysed around four key interests:

- Emotion/volition and enchantment; *Felt life*;
- Affordance and genre of artefacts; appropriateness of resources for meeting mundane *Contingencies*;
- Use of narrative; key stories (a good example is given in section 7.3.7);
- Making sense and overcoming problems; *Making judgements*; *Interplay of personal knowledge with information resources; JP as text*;

Each of these themes was gathered into a code "family" and extracted from the data; as always in the Discourse Analysis, there is a synthetic approach drawing on several traditions, but always asking fundamentally, "*why is this utterance here?*" (Wetherell 1998:388).

A second level of analysis centred on the artefacts; again taken from the discourse data, this considered the ways in which the physicality of artefacts is encountered by service users.

7.2 The Journey Planner as information resource

The TfL Journey Planner is only one of a number of information resources for the traveller in London. Information comes from many forms of *informational object*, which includes *artefacts*: electronic and non-electronic, fixed to a particular place as well as printed and portable. Information might be encountered peripherally, for example as a display at a station, or more intentionally, for example when someone reads a map.

As with the other case studies, this chapter starts with a deconstruction of the affordances of artefacts which are available to travellers. This centred on the Journey Planner, but in this case this is an analysis not of the JP alone but of its place in this constellation of navigational artefacts.

7.2.1 Grappling with affordances

Why might a transport user prefer one form of artefact in their navigation and avoid another? As well as the genre properties, that is, conventional uses of artefacts, an important and often overlooked aspect is the *physical* properties of these informational artefacts and their affordances.

Different informational artefacts have different affordances, such as being light enough to carry, solid enough to nail to the wall, and so on, and also have customary uses (*genre rules* (Spinuzzi 1999)) which people can draw on, customary ways of using a printed map, a written note, or screen genre such as a Journey Planner.

The physical embodiment of people, of artefacts, and the relations between them are crucial to the opportunistic, situated ways in which artefacts are encountered and used in everyday life: in the experience of someone navigating around a city, it

matters whether a printed map is heavy, spreads over too many pages of the wrong size, or gets wet in the rain.

By analysing the affordances of this constellation of information resources, this section lays the basis for understanding the ways in which these resources work together in the lived experiences of users.

7.2.2 Analysis of some informational objects

The following table shows the affordances of some of the main information resources in the JP and related systems:

Form / Substance	Web page or PDF on screen	Printed-out web page or PDF	Information at station/bus stop	Printed map	Human contact	Physical road-sign, bus-stop sign	Affordances of substance
Journey Planner	•	•					travel-ability: warnings of problems/time of journey/unusual journey
Tube map	•	•	•	•			Clear; gives a good idea
Rail timetable	•		•				Gives train times in advance; may be more accurate than JP
JP "end maps"	•	•					Less clear than A-Z; shows only part of route;
Call centre					•		Provides timely information
Information from TfL staff					•		Social information. Conversational: errors can be corrected by asking for clarification
Advice from other passengers					•		
Bus-stop signs						•	Used with route info/printed /written notes
Road-name signs, other landmarks						•	Combines with street map or print-off
Bus-stop information			•				Usually clear and thorough

Form / Substance	Web page or PDF on screen	Printed-out web page or PDF	Information at station/bus stop	Printed map	Human contact	Physical road-sign, bus-stop sign	Affordances of substance
Area map at station			•				Alternative to carrying personal map or asking directions from staff
Bus map	•	•	•				Local, London-wide and night buses; also route diagrams
streetmap.com, multimap.com	•	•					Pinpoint location; shows only a small area; searchable by venue address; shows nearest station; supplements fuzzy results from JP
Printed street map eg. A-Z				•			Shows area in context
TfL cycle map				•			Reliable; zones don't correspond to actual cross-London routes
Cycle map on JP	•	•					Detailed, scrollable, but unreliable; too large if printed
Affordances of form	May need to boot up PC; Un-loseable; Linkable as bookmark copy-and-paste-able; emailable; Click-through-able PDF	Needs a printer; write-on-able; tangible; fileable; unwieldy for use on a bicycle	Available in context; situated	Heavy; road atlas – keep in the car; cycle maps are a convenient size	Face-to-face or phone contact promotes trust; immediacy	Not see-able if bus is steamed up/from single deck (bus-stop) or top deck (street names)	

Figure 19: Form and substance of informational objects for travellers in London

• = form/substance availability

It analyses genres and their affordances, and the ways in which they do, or do not, work together to meet the lived needs of transport users. The table takes the opportunity to show some issues identified in the research for which there is not space for a full description, but necessarily omits some artefacts in order to avoid a rather large and confusing display.

The analysis is drawn from commonalities across the interviews and focus groups. It analyses the affordances of the core artefacts according to two dimensions, form and substance, which, according to Orlikowski and Yates (1994), are characteristic aspects of genres. It should be noted that these two dimensions are useful analytically, but this is an analysis of affordances rather than genres as such. Thus informational artefacts are readily recognisable by the communication medium, structural features, and symbolic system of greater or less formality which characterise their *form*, while the "*communicative purpose*" (Orlikowski & Yates 1994:3) is expressed in the *substance* of the genre.

This rich array illustrates the differing affordances and constraints not only of technology, but of traditional artefacts as well as social interaction, across these two dimensions.

7.3 Lived experience with the Journey Planner

The introduction to this chapter raised questions not only about the artefacts of the JP and related information resources, but also about the ways in which these are drawn on as users navigate around the transport system. Navigation in turn must support the contingent needs of mundane life; this section explores the main findings of the ways in which resources for urban navigation are encountered in the lived experiences of service users.

7.3.1 Peripheral encounters with information resources

For TfL, transport services and their related interfaces are central to their work. For the service user, on the other hand, these interactions are peripheral, often even "*semi-transparent*" (Bødker 1991; Ihde 1979:19) to their daily need to travel. It is impossible to separate the usability of the transport system, and of adjuncts to the transport system such as the JP, from the overall lived experience of transport users.

There is some confusion among service users about what exactly the TfL Journey Planner *is*, as became apparent in some of the interviews; for some participants,

emails and text messages giving warnings of service problems are conflated with the TfL JP properly so called. The contributions of these respondents are nonetheless relevant, since they all use the London transport system and its many information resources. Indeed, the confusion is suggestive of the array of information sources available to the traveller, used interchangeably and to an extent indiscriminately.

7.3.2 Basic problems, and ways to overcome them

Findings from the laboratory observations indicated a number of basic usability problems with the TfL Journey Planner website, which are summarised here and form part of the background for the broader experience of service users with the system:

- Design issues: options being off the screen;
- the JP, if selected from the "buses" or other modal site, gives all-modes information, contrary to the expectations of users;
- if a search is by "Station or stop", then a search done on a street name often unexpectedly gives results referring to a bus-stop name;
- problems on routes are reported, yet it is not clear how severe the problem is;
- fuzzy searching is phonetic rather then by location or spelling (for example, Tower Bridge Road for Gower Street);
- users can often identify better routes from their personal knowledge;
- suggested routes sometimes involve very short stages, for example a bus journey of 100 metres.

The first two of these problems can be understood in terms of affordances as in Norman's (1988) classic account, and more specifically from Gaver's (1991) analysis of perceptible and hidden affordances in design for usability. The next two problems are basic design issues arising from failure to provide a "*match between the system and the real world*" (Nielsen 2005). The remaining issues, though, are complex data or algorithm problems, and as such it is beyond the scope of this thesis to suggest how they might be overcome by design changes.

Although these findings suggest important improvements which should be considered by the system implementers, findings which are closer to the interests of this thesis concern the ways in which service users are able to overcome these problems.

Frequent users described various personally-invented techniques to find the desired information. For example, one focus group participant had discovered that, by searching for journeys in two sections, the JP would suggest what was considered to be a reasonable route, but if requested in one section, the JP gave different suggestions which were seen as less reasonable:

> I sometimes have to break up a journey, because it wouldn't give me a route I wanted, and if you want the combination of means of transport that it's given you, but you want them in a different order, I just haven't managed to work out how on earth you get it to do that, sort of, try again, I don't know. So going to south London, I don't know why, it sort of wanted to send me on about four buses, rather than thinking of the fact that I could just go on the Jubilee Line to London Bridge, and catch a train from there - FG3:P1:508

The remainder of this section presents findings relating to how people make use of the JP; this will refer again in various ways to the analysis of affordances in section 7.2.2.

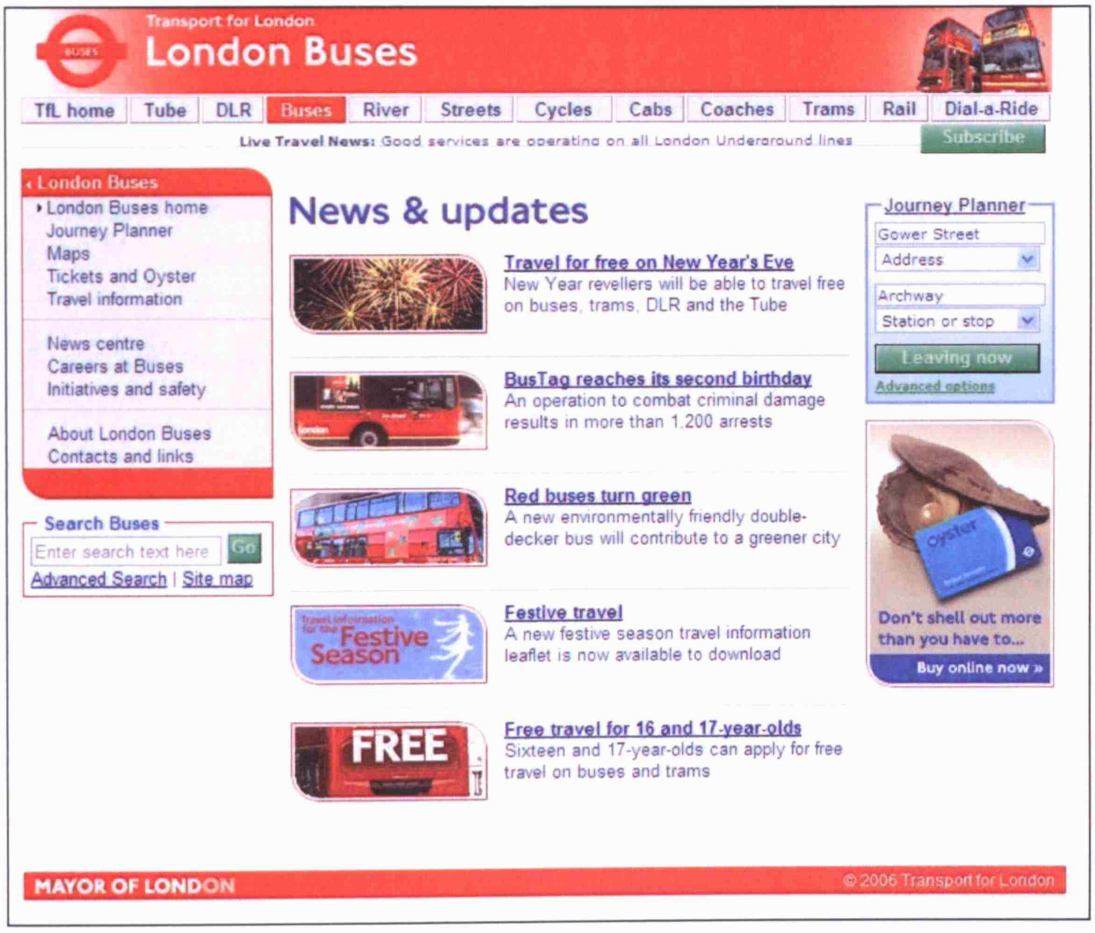


Figure 20: Journey Planner accessible from the London Buses web page

Results showing search by street name, links to start and end maps, two stages in the journey including walking

Figure 21: Journey Planner results on website

7.3.3 Joining information from different resources

A finding common across many of the laboratory observations was the use of a combination of personal knowledge (Polanyi 1962) and other information resources to complete some of the scenarios:

> I never had this much fun. I used to put in a [postcode] and just get it and keep going - Observation Wed 1

It is clear that this user is familiar with the JP but usually searches using personal knowledge, in this case the postcode. Other observations similarly show single items of personal knowledge supplemented by other information, perhaps found electronically on resources such as streetmap.co.uk.

This use of multiple information sources was also found in lived experiences recounted by interviewees. The following short narrative relates the story of a person who found a better route from traditional timetable information displayed at a TOC (train) station, overcoming some misleading information from the JP:

> ... it [JP] was telling me when I first looked ... get the Tube to New Cross Gate, then get on a train to Norwood Junction, wait there, and then get another train to go on to Carshalton Beeches ... Now, what it didn't tell you, and what it still doesn't show, is there is a direct train from New Cross Gate to Carshalton Beeches - II7:149

The striking feature of these examples is the way they demonstrate the use of personal knowledge and skill in using information sources, despite the basic problems described in section 7.3.2 above. This is the interplay of people's personal knowledge with the information available form the JP and elsewhere, a theme which is picked up later in the analysis section of this chapter.

This use of combinations of information resources was the interest behind another question asked in the interviews: what people do with the information from the Journey Planner? For example, do they write it down, print it out, or simply remember it?

The usage depends not only on the complexity of the proposed journey, but on the availability of other artefacts: a printer at home or in the office, Internet access not only at the starting-point but at other places *en route*. For example, one interviewee suggested that he would not print out a Tube map since he expected to be able to look again at the website whenever necessary: "*these days, ... you're always quite close to an Internet connection*" - II17:589

As might be expected, for simple journeys, people generally simply remember the suggested route. But for such routes, they are less likely to use the JP, particularly for journeys involving only the Underground:

> [reasons for using the JP are] usually a combination of, um, Tube and bus, it's particularly buses, because Tubes I know roughly how long it's going to take, but it's when you've then got to get a bus at the other end because I'm going to some, as I say, some strange part of north-east London - II1:41

This is not only because Underground journeys are generally less complex, but also because, as the analysis of genres and affordances illustrates, the Tube map is

widely available, on the website and in signs encountered during peoples' journeys, and also in other forms: it is often printed in pocket diaries and in street-maps.

7.3.4 Planning and *ad hoc* actions

Even the most routine journeys can encounter unexpected contingencies. But, recalling the form of the most central artefact of the JP, the TfL Journey Planner, a website is not generally mobile; for problems encountered while a journey is in progress, emerging mobile practices are enabled through WAP, PDA/WiFi and SMS access to the TfL Journey Planner, although attempts to use these as part of the laboratory observations found these to be unsatisfactory, largely from the physical limitations of a mobile phone or PDA.

Mobile information could allow travellers to bypass disruption or change their daily schedule around revised travel information (Jain 2006). However, the interviews found little evidence of people actually using these channels; the predicted use of mobile electronic resources is restricted at present to the imagined behaviour of "*constructed*" transport users (Jain 2006; Woolgar 1991).

Rather than the use of mobile electronics to overcome contingent changes to plans, the findings emphasise two themes which are central to this chapter: the *in situ* use of whatever is to hand from a constellation of information resources; and the adaptability of plans while the journey is under way.

In situ information could come from non-electronic maps at stations or on bus stops, a telephone call to the established TfL call centre, or on-street kiosks, for example; or, for prior warnings of problems, SMS or email alerts to subscribed services as well as a scrolling display on the TfL website:

> I got stuck in places and I didn't, I don't have like, WAP, or whatever, on my phone ... so I just had to like phone a normal number – FG1:P3:280

Here, for example, is someone who does not use the JP at all, but instead, navigates using artefacts (maps) found in the travelling situation:

> I: Ok, do you carry *printed* maps around with you, all the time?
>
> Um, .. not *really* because, yeah, you can pretty much navigate just by looking at the *maps* on the, at the stations, kind of thing, you know - II17:704

Another interviewee summarises a common usage pattern, highlighting the non-deterministic use of JP information:

> So at the end of the day, the Journey Planner gives me the basic information, so I can *know* what I'm getting *into*, but as to what actually *happens*, it's just open to lots of different stuff I can't control – II19:610

7.3.5 Knowing the system

The research suggests that, perhaps more important than its use for finding routes, the TfL Journey Planner is used to estimate the time duration of a journey, particularly for non-routine journeys taken for work reasons, for which arriving at the destination on time is often critical. This is so, even though the estimated times from the JP are often longer the actual time in the real-life journey. For non-routine although not extraordinary journeys, the transport user often makes judgements about how difficult the journey is likely to be, and, ultimately, whether it is worth making at all.

Time is also a consideration in terms of *time of day*; tacitly drawing on their background knowledge, people will, for example, avoid the bus at congested times of day, or, knowing that transport runs infrequently at night, will use the JP particularly to plan early or late journeys.

There are other judgements to be made about the reliability of the transport system. Regular travellers come to know the transport system, not only at the level of planning journeys according to bus routes and Underground lines, but from experience, from knowing the routes as one might know another person:

> I mean, I know the city well enough, and I know the buses well enough, that, what it's telling me is the best combination, may not be. May be the most *convenient*, but, it may not be the *safest*, the one I don't prefer, and if it doesn't work, I'm [in a mess], cos there was only the *one* bus, ... and so, um, you have less degrees of freedom – II19:464

In situations where the traveller does not "know" the route as intimately, the location and physical form of informational artefacts provides subtle clues to the reliability of information, for example this interviewee who defines trustworthy information as that which is "*nailed to the wall*":

> I tend, if I'm getting on the Tube, I tend to only trust things that are nailed to the wall //right//, cos I figure it it's nailed to the wall it must be fairly accurate - II10:213

7.3.6 Failing affordance ecologies

Section 7.3.3 above and the analysis of affordances present the finding that transport users do not rely on one information resource alone, such as the JP, but draw together situated information as needed, in ways which, to return to a usage of the other case studies, can be understood as affordance ecologies.

However, these affordance ecologies sometimes fail to work together; there is a breakdown, as one of the affordances is unexpectedly unavailable.

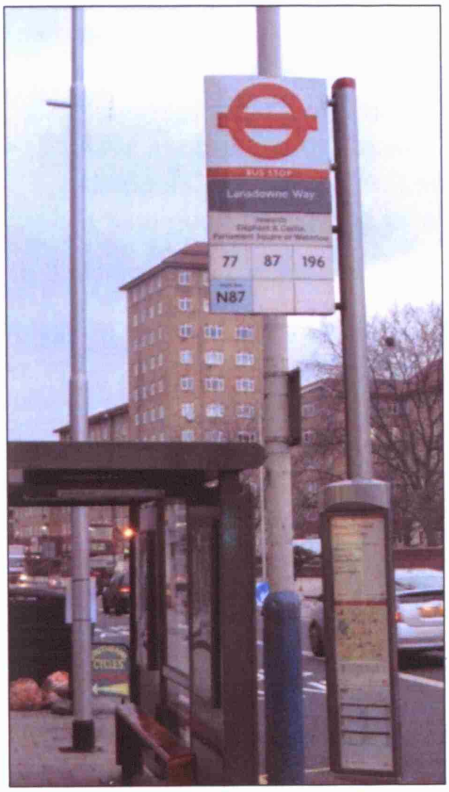
As an example which was found in several focus groups, information about bus routes is distributed across a combination of artefacts: the TfL Journey Planner itself, often used specifically for bus information; other bus information on the TfL website; information provided at the bus stops themselves; and information available to people actually riding on the bus. But this combination often fails, as this focus group extract shows:

> P1: And also I'm not very happy with the London transport, is that when a bus is coming to the next stop, it's going to the next stop, it, er, doesn't tell you which stop is the next stop, so you don't know which stop you need to take off ... because you don't know the, you can't see the, the next stop, so, when you're on a bus ... what I do is, I sit, um, like, on the upstairs, and I see the, you know, the sign on the road, to see which stop is where I am,
>
> I: Yes, because sometimes the bus stops have a label on the bus stop to tell you the name of the stop,
>
> P1: Yeah, but if the bus is very crowded, you can't see the sign on the road - FG2:249

The information about the name of the bus-stop is known to the bus traveller, perhaps from the JP, but if the bus is crowded, or if the windows are steamed up, they might not be able to see the name of the bus-stop on the sign itself.

The point is not only to consider the ways in which the affordances of the bus-stop fail to meet the requirements of the bus user, but to note how the various information resources are expected to work together, and that their failure to do so is a failure of cognitive resources for the service user.

In another nice example of situational problem-solving (section 7.3.2), the service user adopts the simple strategy of sitting upstairs when possible, from where the sign can be seen[10].



Note the stop name high up on the sign, local information and bus route details on the post. "Countdown" is visible in the second view.

Figure 22: Two views of a bus-stop

7.3.7 Making meaning in narrative and interaction

The following rich sample from one of the individual interviews goes beyond other narratives presented in this thesis because it shows the importance of transport, and information about transport, at times of central experiences in people's lives; experiences which are "*formative and transformative*" (Dewey 1934; Turner 1986:35).

This interviewee was soon to move to a new home with a partner, which represents a major life change for them, and, in preparation for this, was using the JP to find the best route to from home to work:

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[10] Since the data collection for this research was completed, TfL have announced a pilot project to make "next stop" announcements and visual displays available on one bus route. This is part of the larger iBus project to improve bus tracking and information (TfL 2005e; TfL 2006f).

> I used it to find out about bus routes, from the new flat, ... and it gave me misleading information, because, um, I wanted to know whether I can, you know, is there a, bus route, directly from Barnes to Putney, and I looked at it, and I thought, "oh, there's one that goes from outside the house, it goes along the Lower Richmond Road, ...", and I thought, "oh, great, I can come along, I can get off the bus ... and walk up", um, and, cos I just put in, I just didn't, it didn't do a time of day thing, I just did a general, and it came, it came up in this list of, direct, rather than two buses that came up as well, so I thought, "great", and then when I actually went down to the flat, to have another look, I looked at the bus-stop, and it turned out to be a shoppers' bus, that didn't start till nine thirty-nine in the morning, so it's no good for getting to work at all, - II13:195

In this narrative, the mundane events of finding some information electronically and checking against a traditional information source (a bus-stop) become meaningful because of the contradictions between the two information resources.

Recalling a finding reported in section 7.3.5, *time* is a central feature of this narrative, both "clock time", since the main thrust of the story concerns the times at which a certain bus runs, as well as "*historical*" (Ricoeur 1980) time in the narrator's life experience of moving home.

This narrative, then, is an account of several interpenetrating worlds: the home move, the virtual world of transport as reflected in the JP contrasting with the physical world of buses and timetables on bus-stops, and the workaday need to make routine journeys.

Reducing this narrative to a simple account of a usability problem with the JP, as an example of "*Error Prevention*" (Nielsen 2005), would be to look only at the "*anecdotic surface of the story*" (Ricoeur 1980:171) and thereby to miss the temporal complexity as well as the emotional content, the dialogical meaning-making, and the *continuing* significance of these events for the narrator.

7.3.8 Information and social inclusion

Section 7.1.1 noted that among the aims of the TfL Journey Planner is to promote "*socially inclusive empowerment*" (TfL 2005i); the TfL Social Inclusion Action Plan 2002-2004 also points out the importance of journey planning and *en route* information for a related aspect of inclusion, physical and spatial accessibility, (TfL 2002). From the evidence of this case study, how well do the information systems for travellers support these aims?

The interests of this study did not include a specific analysis of the accessibility of the interfaces in terms of disability, language, or literacy; rather, the findings of this study have wider implications for social inclusion, considering ways in which the information provision does or does not fit into people's lives.

Pulling together and making use of the disparate information resources available to travellers in London requires an array of often unremarked skills. The findings have shown the importance of the combination of personal knowledge and judgement to make use of the information available, and *bricolage* skill in overcoming failures in the affordance ecology. Map-reading and literacy skills are also *assumed*, as a more fundamental pre-requisite for the appropriation of information.

From this wider viewpoint, accessibility at the interface is only one part of the complex interplay of resources which makes demands which may disproportionately disadvantage less skilled users. The findings suggest, however, that, within limited parameters, even less knowledgeable transport users are able to at least partially overcome problems in navigating the system.

Although none of the research subjects could be identified as socially excluded, the sample did include several whose understanding of English was low, as well as those who, as recent residents, were unfamiliar with London. From their evidence, the information from varied resources is generally sufficiently *clear*, sufficiently *understandable* even for those who do not speak English well, and sufficiently *available*, to enable users to find routes to unfamiliar places, or better routes for routine journeys. However, routes found may not be the most appropriate, quickest or most reliable, and, unable to make the kind of judgements which require deeper knowledge of London (section 7.3.5), such users may be disadvantaged by such sub-optimal information.

7.4 Analysis: dialogical meaning making

Earlier sections of this chapter have shown people finding their way around London using combinations of information provided by the TfL Journey Planner, personal knowledge of the system which may be tacit but perhaps also capable of being articulated, social knowledge from co-workers, other travellers, and staff, and other electronic and non-electronic informational artefacts.

In using the JP and other resources, people take information from these various resources, and use it as a resource for action; in doing so, they are making *meaning*.

7.4.1 Information resources as distributed cognition: "home-made" genres

The need for tools or genres to work together in ecologies, in which "*each creates the environment for the others*" (Hutchins 1995:114), and work together or fail to do so, is a feature of each of the studies in this thesis. This case study is significant for its focus on genre combinations which work to support *cognition*.

The concept of cognition distributed between the user, other people, and artefacts (Alterman 2000; Wright, Fields, & Harrison 2000) is useful here to understand the ways in which users draw on changing forms of information to enhance personal knowledge. Information is neither internal nor external, neither mental nor material, but is represented in *resources* of various kinds.

By making notes, printing out screenshots, or making notes *on* printouts, transport users create for *themselves* artefacts which change the affordances of the information artefact, and, through repeated use, form a kind of "home-made" *genre*.

Genres, both ready-made and developed by individuals and groups for their own use, have been widely studied in shared use by team members in the workplace. Spinuzzi (2003a) describes examples of both individual and socialised genres, for example the making of "*grep scripts*", assembled collections of common usages of the Unix *grep* command which save time and repeated effort. As Spinuzzi has shown, people find different solutions to material problems, and which particular genre is made to fill a particular "*ecological niche*" (Spinuzzi 2003a:109) is influenced by interactions among available genres.

The term "home-made" is used in this chapter to express the fluidity and contingency of this genre use. In contrast to the restricted view taken by Spinuzzi (2003a), this case study has investigated the varied situations of transport use, outside the workplace as well as work-related travel, and the different resources available to service users.

This broader view has thrown light on the same kinds of processes of genre development, but adds new levels of insight. The findings of section 7.3.3 suggest that the complexity of the task and the availability of specific mediational artefacts

are factors in the development of "home-made" genres. The availability of a printer is an obvious factor; but the physical form - too many pages, or too large - is another factor which interviewees reported, deterring the use of printed-out pages.

7.4.2 Making meaning, making judgements

This rather cold understanding of genres has, however, to be rounded out with the realisation, for which Brown and Duguid (1994) provide a subtly-worked theoretical basis, that genres are not only physical objects, but have different conventional uses - more or less authoritative, more or less readily available, having greater or less "*social inertia*" (Brown & Duguid 1994:16). Observing this in the empirical research presented in this chapter, the interviewee who trusts things "*nailed to the wall*" (section 7.3.5, I110:213) invests an official notice with just this kind of authority.

Overcoming problems and finding the way around the transport system is dialogical; it involves the user in making meaning, drawing on their judgement and previous experience. This is a co-construction of meaning in dialogical inter-actions rather than an exchange of information (Brassac 2005). Meaning is made at the boundary of self and other (Shusterman 2000), by readers who are in this sense also writers; recall that, for Bakhtin (1986), in any interaction there are at least two voices: that of the utterer, and that of the hearer. The hearer sees the "other" through a "*relation of difference*" (Holquist 2002:32); the other person or object is perceived and judged from the position of the hearer, the "I-for-myself", in terms which are always socially and historically specific.

Meaning, then, is not simply information, but is the basis for judgements - how reliable is the information?; how long with a journey take?; is the journey worth making at all? Regular travellers "know" the transport system; regular users of the various information resources know the quirks of each, just as Orr's (1996) technicians learn to know particular photocopiers, in an unremarked but highly-skilled achievement of meaning and "common sense" in the solution of everyday problems.

7.4.3 Plans as resources for contingent action

The Trukese Islanders studied by Gladwin (1964) also showed the kinds of skills which are not often recognised for the intellectual achievements that they are. This

navigational skill, without formal planning of the European sort, influenced the insights of Suchman (1987). The circumstances of travellers in the urban setting, if rarely as planned as suggested by the European ideal, are rarely as unplanned as those of these Islanders. At the very least, plans are likely to consist of more than "*the intention to proceed to a particular island*" (Gladwin 1964:175), since they probably include some time imperative and a fairly clear idea of the route that will be taken.

Nevertheless, the changing contingencies of urban travel imply, as with the photocopy help system studied by Suchman (1987), that vagueness is a *strength*; rather than representing every concrete detail, this is an orientation to cope with circumstances which often change as the plan is carried out in practice. Plans should be conceived not as a projected course of action but rather as "*a weak resource for what is primarily ad hoc activity*" (Suchman 1987:ix).

It is in this sense that the many different information resources available to a traveller in London can be compared, and contrasted, with the many resources, "*motion, sounds, feel of the wind, wave patterns, star relationships, etc.*" (Gladwin 1964:172) available to the Trukese islander. Although the resources of the Londoner are more developed and more tangible, the London traveller may not have skills equivalent to those of the Trukese islander, or may be a visitor; in contrast, Trukese navigators are specially trained, even though, according to Gladwin's (1964) account, they are not selected for this training on the basis of any special intelligence in the European sense.

Rather less like a trained European navigator and more like a Trukese islander, the user of the transport system relies on few "*explicit principles*" (Gladwin 1964:175) and more on symbolic artefacts encountered on the way.

The extent to which people actually do *plan* their routine lives goes to the heart of the way computers may be expected to be appropriated in ordinary life. In a traditional viewpoint, people going about their routine business, or doing some non-routine but quite ordinary activities, are following a collection of plans at increasing levels of detail, analogously to the way a computer follows the instruction in a computer program.

This view is significantly challenged not only by the unending complexity, but by the unexpected contingencies and practicalities of daily life; and, as elaborated in section 7.5.1 below, this challenge has consequences for the provision of information systems in support of transport policy.

7.4.4 Overcoming routine troubles: reflective and unreflective action

The narrative of the person moving home and finding that the local bus only runs at limited times (section 7.3.7) is not only a description of events, but also a working out of the problems and their resolution. In this sense, "*diagnosis is a narrative process, the process of diagnosis is the process of producing an account*" (Orr 1996:43); a dialogical process of problem-solving.

While there is no problem, there is no story: the situation is handled using tacit knowledge; it is *transparent*, in Ihde's (1979) terms. Only when there is some sort of breakdown is there a need for more reflective thought (Suchman 1987), which pulls in resources as needed.

In daily use, however, people using the transport system are often faced with solving problems in situations which do not allow sufficient time for reflection, for narrative or retrospective understanding. To use the term which Winograd and Flores (1986) have borrowed from Heidegger, these are situations of "*thrown-ness*"; Schön (1983) gives the example of jazz musicians making on-the-spot adjustments as they listen to one another. This reflection-in-action is not necessarily in the medium of words, more a "feel" for the music or other action.

The information given by the JP is symbolic and could be incorporated into the kind of verbalisable, abstract plans which Gladwin (1964) asserts are typical of the European[11] style of navigation; in contrast, the Trukese islanders do not start with such an articulated plan. However, Europeans do, in different ways, make use of "*routine and automatic*" unreflective selection and accumulation of information, for example when driving a car (Gladwin 1964:172); and, in navigating around London, draw on *personal knowledge* as well as the carefully articulated plans such as those produced by the JP.

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[11] "European" is Gladwin's terminology

7.4.5 Plans and background knowledge

This personal knowledge is accountable, in the ethnomethodological sense that accounts can be given, and is made explicit in the context of the research interview; but it is essentially tacit, not expressed in daily life.

Polanyi (1962) gives perhaps the most fully-worked discussion of tacit knowledge as *personal* knowledge, relating this to the articulation of knowledge and to what are called skills. For Stenmark (2002), knowledge which is articulated, for example in the symbolic artefacts or rules, is not knowledge but information. Background knowledge is needed to understand and make use of information, including that presented as plans by information systems such as the JP; such knowledge is *assumed* not only by the users but by the providers of information.

This vast store of background assumptions forms part of the actor's mental state prior to action, but not consciously so (Dreyfus 1982). Skilled humans are guided by their "*experience-based know-how*" (Dreyfus & Dreyfus 1986:43), except in unfamiliar circumstances in which they feel "*merely competent*". This knowledge is contextual; as Garfinkel's exercise with his students (Garfinkel 1967) demonstrated, attempting to make an account of background knowledge, to uncover the entirety of what Dreyfus (1982) calls "*sedimented beliefs*" in the background of intentionality, is an indefinitely vast task.

The vastness of this store of knowledge is a further challenge to a model of rational action as enactment of pre-existing plans. Such a model relies on specifying in advance the "*inexhaustibly rich resource*" (Suchman 1987:47) on which contextual understanding depends; even apparently simple sequences of events (the plot of a well-known children's story, in his example) quickly exceed the capabilities of this rationalistic model (Agre 1997).

7.4.6 Autonomous problem-solving

Designers of help systems, providers of written information resources, or of information *systems* more generally, are enabling unknown third parties to access *de-contextualised* information. The *autonomy* of the user of these systems is supported by, but not driven by, the information. This reflects the ideal of autonomy which is a feature of "knowledge-based" work and a core principle of, for example, Dewey's pragmatic philosophy of education (Stiglitz 1999). Users' autonomy is not

absolute, and in everyday life people interact with others and with artefacts designed to communicate their use (Alterman 2000).

The sometimes rather unexpected (not to say misleading) routes suggested by the TfL Journey Planner are a dramatic real-life demonstration of the continuing need for personal knowledge in its "run-time" use. The JP, and the panoply of information resources of which it is a part, has the potential to increase the capacity for autonomous problem solving of *human* users of the transport system, but this depends on the skilful interactions and appropriation of the information by users. Usually one information resource is insufficient to form a reliable plan for a journey; section 7.3.3 showed transport users solving problems by "*piecing together clues, which do not indicate a specific cause but rather a pattern*" (Orr 1996:115).

Unlike Orr's (1996) photocopier technicians, a journey on the London transport system is not a machine to be fixed; there may or may not be an observable "problem", and the various forms of information available do not in general present themselves as "diagnostic resources". Nevertheless, as the CLCC case study showed but in quite different ways, there is a similar element of *bricolage*, "*the reflective manipulation of a closed set of resources to accomplish some purpose*" (Orr 1996:121).

7.5 Implications for policy

The analysis of ecologies of artefacts, and the ways these contribute to navigation around the transport system, has implications for the inter-relations of policy and user experience, and lessons for policy-makers.

Policy documents reviewed in this case study have generally placed the TfL Journey Planner in the context of the whole constellation of printed, displayed, and electronic information for travellers. This concurs with the findings here, but there is an important nuance in the finding that the JP itself often plays a supporting rather than a central role in peoples' navigation around the transport system; it is more likely to be used for checking the feasibility of a journey, for estimating the expected journey time, or to investigate better possibilities, than as a purely navigational instrument.

Another area in which policy documents fall short is in their failure to consider the ways in which different genres of information artefacts do, or do not work, together

in supporting navigation. In this, they rely on two assumptions which this thesis fundamentally questions: the assumption that travellers act on pre-made, rational plans for their journeys; and the essentialist assumption that provision of information about sustainable transport options will of itself determine transport use.

7.5.1 Encouraging sustainable transport use

In understanding how transport users might use the TfL Journey Planner, a simplistic view is not unlike that of the Corporation in Orr's (1996) ethnography of photocopier technicians: that the traveller, like the technician, has to do little more than follow the information, or documentation, provided.

The TfL policy around the JP suggests that providing information can make people more aware of the possibilities for sustainable transport or can prioritise information about preferred transport modes, and that "*somehow*" (Garfinkel 1967:10) this leads to the attainment of a rational, common-sense, understanding of the transport system and, ultimately, to changed behaviour on the part of travellers.

As with Suchman (1987) and her photocopier users, the contention here is that it is this *somehow* which needs to be the topic of research. This case study suggests that travellers' encounters with transport information are more complex than the simple model acknowledges, as the details are in the unnoticed background of situated action.

To Suchman's (1987) critique of this view of plans must be added the reality of everyday experience of transport use. This is not only because there are "*breakdowns*" (Flores et al. 1988) in the smooth flow of information and in the physical transport system, but also for more emotive reasons such as a dislike of travelling on busy trains or on particular modes of transport.

Factors other than information may be more significant in determining transport preferences: the discomfort of badly-maintained buses, the heat of the Underground, contingencies such as needing to look smart or wishing to have some exercise. The physical affordances of artefacts may make them more or less usable for the traveller (section 7.2.1). Factors such as these may be in the foreground while knowledge of the transport routes is in the background; they are closer to lived experience, sensual and physical.

7.5.2 Creating confidence in the system

Experiences in other ways are emotional and volitional; information in itself may have emotional impact, for example in strengthening the *confidence* of travellers in the system. Real-time information systems, particularly for buses, are one of the ways in which policy-makers hope to encourage people to feel more confident in public transport.

Unfortunately, the "Countdown" system providing real-time information at bus-stops in London is inaccurate and largely unused, partly because of congestion. A better support system ("iBus"), recently trialled by TfL, based on GPRS and GPS, will enable more accurate information as well as voice announcements of upcoming bus-stops and SMS messages of buses due (TfL 2005e).

In another city, Reed and Wright (2006) have presented imagined internal conversations, based on empirical research, to understand the experiences of a bus user. Their analysis shows the "*rhythmic dance*" of tension and relief in the experience of waiting. The system they studied seems to show many of the same problems as that in London: inaccurate times, buses arriving unannounced, buses delayed in traffic; and so there is a risk that such an information system may add to the uncertainty rather than allaying it.

7.5.3 Bringing users into public transport

In e-government research, citizen autonomy, and the empowerment which is said to come with it, is often said to arise when knowledge, formerly internal to government, is made available to citizens and others (Wimmer & Traunmüller 2000). The experiences of transport users interacting with the JP throw a side-light on this assertion; the knowledge is mostly already public (real-time status information being a possible exception); the innovation is in new forms of availability.

In this sense, the informational artefacts found by travellers in London are *boundary objects* (Star & Griesemer 1989), which "*bridge*" the worlds of users and service providers. Such boundary objects, carrying information across domains, do not necessarily meet the highest standards of accuracy of the worlds which they cross; like a sketch map or a standardised form, it is sufficient for them to be "*good enough*" to fulfil this purpose. However, as in the example of the bus-stop signs

which cannot be seen by people travelling on the bus, breakdowns in the genre ecology may negate this bridging; it is not sufficient for the objects to be "*good enough*" in themselves, but to work together.

For Jain (2006), the rigidity of railway timetables, contrasting with the fluidity of peoples' lives, favours the relative flexibility of the private car. She suggests that this might be overcome as mobile information allows for contingent re-scheduling of travel plans. This argument is persuasive, but use of mobile information sources, or situated electronics such as on-street kiosks, does not seem yet to be occurring in widespread practice. Rather, information is encountered in situated action, in passing, contingently, as needed, often in the form of traditional artefacts. It is this *working together* of diverse information sources that allows for real-life, fluid navigation around the transport system.

For policy-makers interested in encouraging use of sustainable transport, the central realisation is that it is not the electronics alone, but the ecology of information, social interaction, and personal knowledge which conjoin to support intent and enable action for transport users.

7.6 Conclusions

In contrast with the other two case studies, this study takes an e-government application, the TfL Journey Planner, as the centre of a constellation of other information sources, both traditional, developing, and electronic, arguing that it is not with the JP alone, or even the six "*Information Touchpoints*" defined by TfL (TfL 2005i), but by putting together many pieces of information that the skilled "navigator" negotiates the complexities of the London transport system.

The work of Gladwin (1964) challenges the traditional Western understanding in which navigation is seen as a *planning* activity, in which most of the effort is done in advance and the plan is simply followed in action. In this chapter, these insights have been amplified by taking them into the lived experiences of transport users. Suchman's (1987) essential realisation that plans are a *resource* has become well accepted in HCI research and practice, but this needs to be carried into e-government policy. On this realisation, this chapter makes a contribution to the opening up of unconsidered assumptions about the relations between information provision and human behaviour.

7.6.1 Planners and skilled navigators

Inspired by Suchman's (1987) use of the study by Gladwin (1964) of Trukese navigators, the comparison has been drawn here between the carefully planned European ideal and the reality of situated, contingent mundane action. However, Gladwin's point is that what seems to the Western tradition to be a haphazard way of proceeding is in fact a highly skilled and sophisticated intellectual achievement.

Even though, unlike Trukese navigators, London transport users have not undergone special training, they nevertheless have personal knowledge of the city (even if they are a visitor), of urban transport in general, and of many other navigational skills. In finding their way around the transport system, transport users draw on their skills and experience in a way which is more Trukese than "European".

Unlike the photocopier study of Suchman (1987), but rather like Gladwin's (1964) Trukese navigators, the traveller in London encounters many sources of information. Sometimes, the details given by the TfL Journey Planner itself are less accurate than the user might expect, but, taken with other sources and peoples' own personal knowledge, they are "*good enough*" (Star & Griesemer 1989) to form part of a contingent, changeable travel plan.

7.6.2 Dialogical meaning and the hard physicality of lived experience

The interplay between personal knowledge, information sources such as the TfL Journey Planner, maps, signs, and leaflets found in the environment, and knowledge from other people, distributes information and supports cognition through a constellation of diverse resources. This chapter has been particularly concerned to show how the different sources of information express different genres and have different affordances, and different aspects of form and substance. These define the ways people encounter and can make use of these genres, and the ways in which they match, or fail to match, the contingencies of their travel needs.

The traveller is also changed by their interactions, and by the experiences which flow from them. In the dialogical relationship between self and "other", JP users are continually *becoming* a passenger on the transport system, a knowledgeable person about London, an experienced navigator.

The JP exemplifies the virtuality of the on-screen activity as it relates to hard, real-life experiences of missing trains or waiting at bus-stops. Errors of information can have physical and practical consequences for the lived experiences of transport users. Conversely, finding new and better routes around the city may even be "fun"; navigation is an intrinsic though often overlooked part of the experience of urban transport.

7.7 Chapter summary

Research contribution	**Contributions of this chapter**	**Mainly in sections**
Contingencies	Trukese and European styles of navigation compared	7.4.3
	Vagueness as a strength; people adapt plans to meet contingencies; plans as resource not determinant for action	7.4.3
	Planning as ideal compared with situated action; making meaning and solving problems	7.3.2, 7.4.2, 7.4.6
	Encountering JP opportunistically; undifferentiated use with other resources	7.2.1, 7.3.1
	Travelling is neither completely routine nor completely problematic	7.4.3, 7.5.1
	Implications for policy; autonomous problem-solving	7.4.6
Making meaning	Making judgements based on personal knowledge and external information	7.4.2
	Making judgements based on genre; judging the reliability of information	7.4.2
	Overcoming basic problems	7.3.2, 7.3.6
	Making sense through narrative	7.3.7, 7.4.4
	Narrative compared with unreflective action	7.4.4
	The importance of time in the JP	7.3.7

Research contribution	Contributions of this chapter	Mainly in sections
	Differences between JP and the real world	7.3.2, 7.3.5, 7.3.7
	Solving problems with web-based information: laboratory observations	7.3.2
Information in the head and in the world	Affordances and cognition; different genres are used in different situations to make up ecologies	7.3.3, 7.4.1
	Basic problems as affordance problems	7.3.2
	Importance of affordances for differing contingencies	7.2.2, 7.4.1
	Using JP alongside other online information sources; printing off and making "home-made" genres	7.3.3, 7.4.1
	Information-in-the-world: using maps and other information found in the situation	7.3.4
	Mobile information resources are not (yet) much used	7.3.4, 7.5.3
	Background knowledge; tacit knowledge drawn on in travel plans; accountability of tacit knowledge	7.3.3, 7.3.5, 7.4.5
	Bricolage and problem-solving	7.4.6
	Feelings about artefacts; feelings about different modes of transport	7.3.5, 7.5.1, 7.5.2
	Failing affordance ecologies: seeing signs at bus-stops, lack of announcements on the buses	7.3.6
	Interpenetrating worlds; life experiences, virtual JP, workaday world	7.3.7
Policy and technology	Interaction with information is more complex than simply the official channels	7.5.1
	JP and the panoply of information of which it is a part allows for autonomous problem-solving by users, but this also involves meaning-making and judgement	7.4.2, 7.4.6, 7.5.1

Research contribution	Contributions of this chapter	Mainly in sections
	JP as boundary object: "good enough" information	7.5.3
	Creating confidence in the system, or failing to do so	7.5.2
	Information from JP and elsewhere joins with tacit, personal knowledge	7.3.3, 7.4.5, 7.5.3
	Neither appropriation of information nor affordance ecologies are unproblematic; making meaning and dialogical relations	7.4.2, 7.5.3
	Social inclusion/exclusion	7.3.8

Table 7: Summary of contributions of the JP case study

PART III: COMMONALITIES ACROSS THE CASE STUDIES AND LESSONS FOR STAKEHOLDERS

Chapter 8

Review and analysis of the three case studies

This thesis has addressed the inter-relations between usability and public policy, firstly on a theoretical level and then in the real world of transport in London. This chapter draws together the theoretical and empirical sections, with a review of the approach taken leading to an analysis of commonalities and contrasts across the cases.

The commonalities and contrasts are considered first on a practice, contingent level, and then in terms of the lived experiences of transport users. This leads to a re-consideration of public policy and lived experience and to lessons for groups of stakeholders. The concluding chapter which follows draws more general hypotheses from these commonalities and lessons.

8.1 Review of the approach taken

The emergence of e-Government throws new light on the boundaries between the social and the technical. Social questions are themselves intertwined with policy issues; the opaque social structures or common-sense sociological typification which are the topic of ethnomethodology (Suchman 1987; Suchman 1994) come into contact with the discursive, written texts of public policy.

The underlying approach is united by a critical avoidance of essentialist assumptions and an attempt to understand the situated sense-making of everyday actions. This draws at root from phenomenology and its descendants, ethnomethodology and Discourse Analysis.

8.1.1 A social and technical viewpoint: affordances and ecologies

Technological systems are both social and technical, but the fundamental social/technical dichotomy is called into question by Grint and Woolgar (1997). They are right to open up this dichotomy by denying essentialist assumptions; "actual properties" of physical objects should be treated as constructions, rather than as essentially part of their "nature". Nevertheless, there are limits to interpretive flexibility, as they admit; "*the construction of technological capacity is not itself unconstrained*" (Grint & Woolgar 1997:10). In this thesis, as understood in section

2.2.4, this limit has been taken as the *affordances* of objects (Hutchby 2001); not all artefacts are equally malleable.

On this understanding, affordances provide a useful analytic viewpoint to place artefacts in the contexts of the users' interactions without resorting to essentialism. This use of affordances is not a denial of anti-essentialism but rather an investigation into the constructions which are possible within an ecology. The approach takes seriously the physicality of technology, overcoming the criticism sometimes made of Information Systems research for failing to focus sufficiently on the technological artefact (Orlikowski & Iacono 2001).

However, the boundaries of artefacts are themselves negotiable, shifting, and permeable. Moreover, as the consideration of change in use shows, the "*essential affordances*" (Cornford 2003:8) are ultimately judged and appropriated by different stakeholders in many different ways, acting in *local* contexts. It is not necessary to take the strong view of social constructionism in order to see that affordances at the boundaries of artefacts are *interpreted* by those who design them and by those who encounter them. In these interpretations, both service provider and service users are active participants, "writers" as well as "readers".

8.1.2 Genres and affordances

The related analysis in terms of genres is a further reflection on this concept of "reading" objects in the environment. As understood here, genres and affordances are two rather different, albeit related, concepts. Certainly they have different origins, genres from literary theory (Bakhtin 1986) and affordances from the ecological perception of JJ Gibson (1977). Genres are fundamentally *social* constructs, whereas affordances refer to the perceptions and possibilities for action of *an organism*. But the use made of the concept of affordances in this thesis is double-sided; it is concerned both with the possibilities for action of service users, and with the meanings they make. These meanings are correctly called "social" in contrast to the technical. This so, even though the experiences are individual, since in Bakhtin's terms the "self" is constructed in dialogical processes with others.

8.1.3 Encountering interfaces in daily life

As computers become not so much *invisible* as increasingly woven into the fabric of life, human interactions with computers are increasingly made using a wide variety

of *channels* or media. The case studies contribute to an understanding of the usability of interaction with these emerging channels.

This thesis accords with Suchman (1987) in seeking to understand the situated, contingent circumstances in which humans encounter technology. Suchman's case study likewise focussed on what was then a new and atypical form of human-machine interaction, in her case with a new design of photocopier. As new varieties of channel become more ubiquitous in daily life, practice-based research into these interactions becomes more urgent. However, rather than detailed recordings of interactions in practice, the approach taken here has concentrated on the *experiences* of people encountering technology, through the accounts which they give.

People appropriate information systems in ways not predicted by their designers; and people also have everyday knowledge and local expertise which is not available through computer interactions. This is called "tacit" because it is not expressed in language, or "sedimented" in that it underlies mundane actions. But neither of these words quite captures the ethnomethodological insight that, in "*the actual occasions of interaction*" (Garfinkel 1967:9), this knowledge is un-considered and un-problematic, yet makes immediate sense for the participants.

Another viewpoint on the ways in which information "*in the head*" and "*in the world*" (Norman 1988) work together as *resources for action* (Wright, Fields, and Harrison 2000) is provided by Distributed Cognition research; this secondary view forms a constant underlying theme throughout this thesis.

8.1.4 Narratives of experience

The main route taken in this thesis to understanding these contingent, situated interactions is through discourses in in-depth interviews and focus groups, and other discursive data in policy debates and documents.

As well as analysing the interviews and focus groups using Discourse Analysis techniques, a number of key *stories* were identified. This is not simply an alternative analysis but is drawn from Jerome Bruner's understanding that the social world, the "*rich and messy domain of human interaction*" (Bruner 1991:4), is represented and constructed through *narrative*.

Stories are *accounts* of specific events and, for the purposes of this thesis, there are two particular reasons for studying them. Firstly, stories reflect lived experiences,

often displaying particularly clearly the feelings engendered by these experiences and the ways in which design details of the system have contributed to these. Secondly, stories show people making sense of aspects of the system and drawing on their understanding to overcome problems; indeed it is often through the stories that they come to this understanding (Orr 1996). In the Oyster study, for example, there was a story of a user who was charged unexpectedly for out-of-zone journeys (section 5.3.3); the transport user had an understanding of the working of Oyster, but a sudden failure of the card in use led to new understanding, assisted by staff at the ticket office.

Narratives are not simply stories that people tell; they show people actively making *sense* of the world, and, also *frame* the world. As Jerome Bruner has said: "*our experience of human affairs comes to take the form of the narratives we use in telling about them.*" (Bruner 1991:5). So it is more than simply making sense of something already made, but actually a "making" of the experience in the recounting.

These stories are also strongly felt, as in the charged conversation with the staff at the ticket office. The word *Befindlichkeit*, often translated as "situatedness", captures not only the circumstances of action but also the emotional disposition which they engender (Ciborra 2005).

8.1.5 Interactions as dialogical experiences

What the research presented in this thesis shares with emerging research in human experience with technology is an interest in artefacts not as cold, dead, finished objects, but as objects available to be understood and included in the daily experiences of those who encounter them.

This understanding of affordances and genres is therefore a *dialogical* view. Objects are in a *relation* with those who make use of them; they are "others" to the "selves" who encounter them through their affordances. But this is a not a binary opposition, but an asymmetric dualism (Holquist 2002), in which both are changed and both are committed. This continuing change is unfinalisable, yet the "characters" develop over time, and this similarity with the literary novel provides a new viewpoint for human relations with technology. For example, Blythe and Wright (2005) consider

some unconsidered affordances of an iPod as part of a larger "novelistic" approach to user experience through imagined scenarios.

Ordinary daily life is emotional, bearing the potential for enchantment, as well as for anger, frustration, or perhaps joy at the successful solving of a problem (Dourish 2001; McCarthy & Wright 2004). Recall the finding of the multi-layered experiences with Oyster, and the immediate needs of transport users in the JP study, for example to find a suitable bus route, fitting into their larger purposes.

Different worlds interpenetrate: superficial "non-experiences" with the CLCC cameras; transparent, *ready-to-hand* interactions with the Oyster touchpad; "breakdowns" as objects force themselves to *present-at-hand* attention. Finally, these levels of experience build into the larger experience of travelling, and of the lived life of which the journey is only a part.

8.2 Contrasts and comparisons between the cases

The systems studied in these cases were chosen partly for contrasts in terms of their interfaces, their relation of application to traditional interaction, and ways in which users relate to them. Despite these contrasts, the cases showed many common features. In this section, these commonalities are presented. Later in this chapter (section 8.5) these commonalities are drawn together to form lessons for groups of stakeholders; in the concluding chapter, they form the basis for emerging hypotheses and suggestions for further research (section 9.4).

8.2.1 Dealing with the complexity of the transport system: abstraction and embodiment

The fundamental way to manage complexity in information systems is by abstraction, "*the very stuff of system design*" (Dourish & Button 1998:14). Yet, as Dourish and Button also discuss, abstraction can also lead to failures because "information hiding" may make important information unavailable to the user.

The Oyster system provides some clear examples of the contingent need to expose some of the underlying details of the system. The automatic deduction of fares in Pay-as-you-go, especially since the introduction of the Daily Cap, masks the complexities of the fare structure. An Oyster user could avoid the need to calculate daily fares, but if their card unexpectedly runs out of stored value, this may be pushed forward into their awareness by the hardness of a closed ticket barrier. And

this might follow a combination of circumstances which they only partly understand, such as unknowingly travelling out of zone. For some people, the opacity of the Oyster system contrasts with the embodiment of traditional tickets, epitomised by single-use "Carnet" or "Bus Saver" tickets; the link between the physical artefact and the fare value that it represents could not be more direct.

The abilities of the information systems to mask the complexities of the transport system and to provide a "*seamless*" journey (GLA 2001e) are compromised by real-world realities. Perhaps the most cogent example is the non-availability of Oyster Pay-as-you-go on some train services; the user *does* have to be aware of some details of the fare structure and of a complex set of associated rules. Failure to do so is likely to end in the non-virtual experience of bodily encountering a ticket barrier.

In a similar way, the TfL Journey Planner provides an abstracted view of the transport system, without which it would not be usable or useful. Yet, because the results given are sometimes sub-optimal, users do need to "*push and prod*" (Dourish & Button 1998) the system to obtain the information they need, and, in some cases, become skilled in doing so.

The electronic, virtual plans provided by the JP will eventually lead to some real-world practices, in which details such as distance to the next bus-stop become very relevant. These details, directly observable in the physical world, are sometimes hard to link to their corresponding representation in the virtual JP world. They may be available to the user of the JP, but might be unnoticed if the interface "masks" them.

8.2.2 Ecologies of affordances and daily contingencies

A common thread running through the cases is the ways in which mundane contingencies of daily life combine with technological systems in the lived experiences of transport users; the boundaries of the computer and its interfaces become "*blurred*" (Agre 1995). Technology outside the workplace - as well as within it - is *interleaved* with everyday routine activities and is constructed by, as well as constructive of, "*the very routine of [home] life*" (O'Brien et al. 2006:292).

This realisation represents a challenge to the information-processing view of interactions with computers from the 1980s and 1990s (McCarthy & Wright 2004). This is given new urgency as computers extend from the workplace into all areas of

life and so into the daily routine in new ways (Bertelsen, Eskildsen, and Sperschneider 2003; O'Brien et al. 2006); the contingent events of everyday life are inevitably complex, unpredictable, and messy.

The usability of SMS text as a channel for mobile payment provides some good illustrations; the small size of the keypad, for example, and the constraints on the quantity of information that can be conveyed, result in the need to combine SMS with other, richer, media in order to complete transactions, but these additional interactions give rise, in turn, to further usability issues. The "simple" usability problems presented by the physical constraints of SMS come into contact with the everyday needs of CLCC payers. Usability implications of the opacity of the data on RFID tags, as used on the Oystercard, provide another pertinent illustration of this failure of simple interfaces to meet the complexities of life.

What the ecologies have in common is the matching, or failure to match, the interactions to the *context*. The literature of ubiquitous computing is rich in considerations of context-aware computing; but, as Dourish (2004) elaborates, context is not something separate from interaction, but rather context is a mutual achievement by parties to an interaction as part of their everyday, common-sense understandings of the social world.

But work, or other activities, contains elements of both the routine and non-routine (Walsham 2001). The interactions studied in these cases are all *part* of users' lives and are encountered momentarily and contingently. The journeys of which they are a part may or may not be routine for the system user, but are always open to change and to unexpected events. The systems which support them, therefore, must retain openness and possibilities for improvisation.

8.2.3 Design-in-context and bricolage

The putting together of information which the traveller finds "to hand" is understood as a form of *bricolage*, a use of signs from various concrete entities; these entities are found in the environment with minimal adaptation needed for use (Lévi-Strauss 1966). So this, too, is a joining of the abstract virtuality of information systems with the concreteness of embodiment.

In the JP study, this opportunistic taking of resources from a constellation of artefacts to plan the journey is particularly clear, but so, too, is the case of someone

who prints out a receipt for the CLCC, or makes sure that an email is sent to them which they then save as proof of payment.

Design is a continuing process in which the user is an active participant; "in-use" design, contrary to the traditional model of lifecycle-based development, presents an entirely appropriate model, as Lin and Cornford suggest (2000). Newness is not only to be found in innovative technology but *emergent* features of systems in use (Cornford 2003).

The systems studied here are not configurable in the way of, for example, a macro or script writing system (Spinuzzi 2003a), but may be amenable to appropriation, or "enlisting" (Spinuzzi 1999:18), in ways not intended by the system implementers. The Oystercard cannot be folded, written on, torn up, and (perhaps the key affordance) cannot be read without some mediating genre; "*the potential for agent-directed change via ICT design-in-use*" (Lamb & Kling 2003) is low.

Nevertheless, as "texts" (Grint & Woolgar 1997; Woolgar 1996), these artefacts afford alternative readings. The Oystercard, for example, is a hard, blank card; but it could be carried in a wallet or its own plastic wallet could be used to carry notes. It could stand as a symbol of London citizenship, or local citizen cards could include Oyster functionality.

8.2.4 Making sense of the system

By making meaning of the systems, service users understand how to use them within the constraints of their own lives. They also understand shortcomings in the way systems fit with their needs, what have been called *breakdowns* in the ecologies of affordances.

Making meaning in situations which the totality is not immediately available for perception is a process of uncovering hidden affordances (Gaver 1991); affordances which may also be *sequential*: a little "*exploration*" (1991:81) following an apparent affordance leads to the discovery of further affordances.

Each of these case studies shows the interplay of affordances, sometimes in more complex ways than is often considered in the affordance design literature. The extent to which perception of affordances is a factor of learning and cultural background is a matter of continuing debate, but this is not integral to the argument here; the point is to consider how artefacts *afford* action.

8.3.1 Between means and ends

This thesis, though, has looked more deeply than the affordances and surface genres, because these lived experiences are emotional, aesthetic, and volitional as well as cognitive. Inspired by Lave (1988) and other practice theorists, by Deweyan pragmatism, and the dialogism of Bakhtin, one of the main underpinnings of this thesis has been a rejection of the duality between the emotional and "*cognitive-rational*" (Lave 1988:7) components of thinking; "*it is not possible to divide in a vital experience the practical, emotional, and intellectual from one another*" (Dewey 1934:55). This realisation has been developed in HCI research by the innovative work of McCarthy and Wright (2004).

In the CLCC, for example, the experience of forgetting to pay is emotional and unsatisfying. These emotions are bound up not only with the practicalities of the payment process and the annoyance of a financial loss, with frustration on the part of the charge-payer at their mental slip or anger at the perceived unfairness, but also with the intellectual sense-making through which a person understands how the situation has arisen and could have been different.

8.3.2 Interactions as aesthetic experiences

Many of the interactions described in this thesis – passing through a ticket barrier, glancing at a Tube map, driving past an ANPR camera while hardly being aware of it – are experiences in a sense, although in Ihde's (1979) sense they are transparent, hardly noticed by the transport user. This is how it should be; without this, there are breakdowns (Flores et al. 1988). Nevertheless, although such an interaction is experience, it is not *an* experience, it is not *aesthetic*, in Dewey's (1934) sense, because it is only partial.

In contrast, for Dewey (1934), experience*s* (in the plural) are aesthetic, not in the sense of fine art but in the sense of completeness, coherence. The transparent encounters with technology in daily life are part of *experiences* in this sense. The payer of the CLCC, whether they pay on time or late, whether their payment is straightforwardly successful or is in response to a PCN, achieves some form of completeness. The experience*s* with the system are emotional; strong emotions of anger at some technological problem, or the softer emotions of satisfaction or of a mental "wave" to a passing camera.

Meanings can be external or internal: it is possible to like or dislike the Oystercard in its blueness and blankness as well as to enjoy the possibilities for convenience and for travel which the Oystercard represents, or to be annoyed by the frustrations of its shortcomings.

The experience of finding that there are insufficient funds on an Oystercard, for example, although mundane in itself, is frustrating, and perhaps prevents the journey altogether if the would-be traveller cannot find the right change. The point of these examples is not a trivial question of annoyance with a daily breakdown, but of experience in context since these feelings are not "*separate from the situation*" (McCarthy & Wright 2004:15).

8.3.3 Becoming and making meaning in dialogue

The development of the *self* in dialogue with others, unfinalisability and the rejection of ultimate unity, commitment to the *oughtness* of being in events, and tensions between the social and the individual, and between novelistic and "epic" formalisations: these central insights of the dialogical perspective developed in chapter 2 (section 2.4.4) provide essential perspectives throughout these case studies.

The Journey Planner, for example, is ostensibly authoritative, but, recognising its flaws, service users take the raw, fallible, information which it provides and bring it into their own experience and knowledge. Refusing its face-value simplicity, they incorporate it with other information sources, each judged in subtle ways according to whether it is more or less authoritative and reliable.

A dialogical perspective is also evident in the *richness* with which people endow mundane experiences. Payers of the CLCC feel almost a personal relationship with "Mr. Livingstone" or the various artefacts with which they come into contact. They accept or reject the official figures about congestion levels and exhortations to use sustainable forms of transport. They recognise the inflexibility of systems in which there are few "street-level" public servants, and the contrast between pre-fixed administrative policies and their daily contingencies.

The Oyster and CLCC studies exemplify the *unfinalisability* of the systems. e-Government systems are not implemented once-for-all, but build on earlier systems and continue to resonate in later policy developments. For example, Oyster

stands on the basis of ticket systems reaching back to the history of public transport. The CLCC system is continually changing in response to changed political realities, new technologies, and the need to ensure policy acceptance. The ultimate perfect system is a mirage; there is no final word: "*there are no limits to the dialogic context ... it extends into the boundless past and the boundless future*" (Bakhtin 1986:170 in Methodology for the Human Sciences).

8.3.4 Values and volition with technology

A dialogical view is committed not only to emotion, but also to volition and values. Sometimes, this is in the clash between what are perceived as personal values and the imperatives of the e-government system; at other times, they reflect the "*moment-to-moment oughtness*" (Hicks 1996) of transport use.

Recalling Bakhtin's (1993) demand for moral *commitment* in action, in the case of the CLCC, there are competing value-laden voices; some highly organised, such as the Sod-U-Ken and Wise-up-and-Pay[12] websites, and some more personal. Those who interpret the CLCC as a challenge to their "right" to drive on the roads, for example, are both drawing on and constructing value-laden discourses, although, as has been noted earlier, it is probably too soon to assert that these have yet formed into consistent interpretative repertoires in Potter and Weatherell's (1987) sense. Conversely, there are those who have made different decisions regarding the charge: that they will prioritise public transport use, for example, or that they will continue in their already low and (as they perceive it) necessary car use.

There is no way to avoid commitment in action. Norman (2004:157) argues, "*technology often forces us into situations where we can't live without the technology even though we may dislike its impact*". In the Oystercard, the recording of journeys is seen by some as a challenge to their personal values and an example of "trickle-down" authoritarianism; for those who feel this way, there is a dilemma between resisting this challenge and accepting the relative convenience of the card. Whichever path they choose is a committed, volitional act following their *oughtness*.

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[12] http://www.wiseupandpay.co.uk/; http://www.sod-u-ken.co.uk/ (last retrieved: 14/12/2006)

8.4 *Lived experience and public policy revisited*

From this review of the findings in the empirical research which forms the heart of this thesis, it is now possible to re-consider the two-way interrelation between public policy and lived experience; and, from this, to suggest implications for the achievement of policy objectives in terms of changing the behaviour of transport users and lessons for policy-makers.

8.4.1 Technological change and new policy options

Technological change and its relations with social change is the unspoken background to all of these case studies. As early as the Smeed report (1964) into road pricing, the availability of technology to implement the proposals was discussed in detail (including the possibility of a clockwork meter in the car).

In comparison with the planning of journeys or the collection of tickets, activities which long pre-date electronic interventions, a system such as the CLCC could not operate without still-developing technology; the system and its support infrastructure are *dyadic*, in Dodge and Kitchen's (2004) sense, since both are mutually constituted.

However, all three cases are fundamentally concerned not with technological systems but with policy needs. In the Department for Transport White Paper (DfT 1998) for example, technological measures are a relatively small part of the options suggested as part of a city-wide (integrated transport) and potentially national (road-pricing) strategy. This realisation, and the detailed consideration of situated action and lived experience with technology, calls into question the notion that e-government, or technology generally, can in itself "*transform the relationship between the public and the public sector*" (Jones & Williams 2005:11).

e-Government is certainly more than the use of ICTs for streamlining existing government activities; the cases studied here offer new services, or existing services in new ways, which go beyond "*the narrow functional efficiency view*" (Navarra & Cornford 2005). e-Government therefore is both more potentially innovative as a policy enabler, and at the same time more constrained, than is suggested by a simple transformation model.

8.4.2 Prosaic experience and the rhetoric of usability

It would be too simple to say that policy-makers do not consider usability in designing policies. Even in the Smeed report on road pricing (Smeed 1964), the importance of a system which is seen to be fair and not impose excessive responsibilities on drivers was recognised. The debate in GLA meetings about extending the time limit for CLCC payment shows that the Mayor and councillors are aware of the usability implications of their policies.

The issues are fundamental; in the CLCC, the system, being a licence scheme rather than a billing scheme, places the onus on the user to pay. Enhancements to make payment easier or to reduce the problems of forgetting to pay are good in themselves but do not overcome this basic design issue, which is a *policy* issue. Simple daily contingencies, such as forgetting to pay the CLCC or to add value to an Oystercard, are not epiphenomenal, but rather are the very essence of usability.

The consideration is, then, how service users go about *being-a-transport-user*, or *being-a-CLCC-payer*; the various interfaces available to them are resources, and their actions take place not in the abstract, but in particular circumstances. The usability of the system in their lived experience is not a question of matching ideal-type cognitive models with rational systems, but of providing resources from which the transport users can co-construct the system in ways that are meaningful to *them*. These prosaic acts are meaningful to service users, not in the interactions with technological system, but in their lives. Recall the story of the person moving home and needing to find a new route to work (section 7.3.7); the simple act of checking bus routes had deep meaning for *her*. Czikszentmihalyi (1991) gives examples of people finding meaning in the most mundane activities, people who see no distinction between what would normally be considered "work" and "leisure".

It is failure to meet these expectations, and so to inhibit the experiences of *being-a-transport-user* or *being-a-driver*, which leads to antagonism. Antagonism in this sense is not simply a confrontation, but a disparity in power, a constraining and a limit, or boundary, in which the "Other" prevents one from being totally oneself (Laclau & Mouffe 2002). Such antagonism is particularly clear in some respondents to the CLCC study (section 6.3.5), but also with the Oystercard, people expressed antagonism towards the system, in the recording of journeys mentioned in section 5.3.4 and in constraints on action imposed by the system architecture.

8.4.3 How lived experience impacts on policy and ...

The cases analysed here show interface problems impacting on the implementation of public policy; for example, the opacity of the Oystercard (its lack of the affordance of being readable) combined with the lack of clarity at ticket barriers creating confusion for users; the usability of the Journey Planner compromised by unexpected data problems.

But often the relationship is more complex than this. A usability shortcoming in an interaction might compromise attempts to overcome issues in the lived experience. The problems which people expressed with SMS payment of the Central London Congestion Charge are a good example of this, because a usable mobile payment channel could go some way to overcoming negative experiences such as forgetting to pay, finding oneself away from home when needing to pay, or being unsure whether payment has succeeded.

In the case of the TfL Journey Planner, by contrast, the study questions a simple relation between increased information and greater propensity to public transport use. The mixed use of information is highly social and contingent: in some cases it would not be socially acceptable to contact a person at the destination, but in other circumstances other passengers or staff are an important, and often unconsidered, information resource beyond the "channels" of information presented in the TfL literature.

Poor user experience can lead to antagonism, and, perhaps, to resistance. In various ways, resistant *acts* are discouraged by the service providers; in the case of the CLCC, by a heavy penalty charge, in the case of the Oystercard by fare differentials with cash-bought tickets.

However, as Markus (1983a:441) argues, "*Resistance is not a problem to be solved so that a system can be installed as intended: it is a useful clue to what went wrong and how the situation can be righted*". In the case of public services, putting situations right may involve intervention by elected or non-elected public servants, at "street-level", in management, and in further systems design.

For example, the recently introduced *Auto Top-up* for Oystercards demonstrates that implementers of public services can and do respond to the continually emerging needs of service users. To draw again on Bannon's insights (1991), design is a

process requiring the involvement of users and the consideration of usability at all stages.

8.4.4 ... how policy impacts on lived experience

These studies of three examples of e-government in one application area have uncovered a complex web of positive and negative experiences. These are not mainly simple usability failings, but are contingent on details of interaction by transport users in situated practice; these experiences at the interface with the system and in wider life have their basis in fundamental policy decisions.

To take the issue of payment of the CLCC, for example, the problems arise not from one single policy, but from a combination of policies which together make demands of the charge-payer. These issues are being addressed by continuing small policy changes, for example extending the payment deadline and introducing reductions for period payments; but the onus remains on the user to remember to pay.

To take another example from the Oystercard study, the complexities of the Transport for London fare structure lead to a situation in which either the transport user must understand a large (and frequently-changing) set of rules, or must trust TfL to make the fare calculation correctly; this is compounded by the blankness of the Oystercard and the small amount of feedback to the user at the transport gate. Some of these fare complexities, particularly the changes introduced in January, 2006, arise *from* the desire of TfL to encourage the use of Oyster pre-pay over cash fares; the policy to promote Oyster therefore *itself* has negative usability implications.

Policy impacts on usability are not all negative. Although flawed, JP information for cyclists and walkers is an example which is particularly well-focused in support of policies for sustainable transport. However, the JP is being actively promoted by TfL with publicity campaigns and encouragement for other websites to link to it; the flaws in the journey searching algorithms or data suggest that it is not yet mature enough for this high level of exposure.

8.4.5 Interpenetrating layers of imperatives: political, institutional, technological

As has been suggested in various ways in the reports of the case studies, the design of e-government systems is constrained by multiple imperatives:

1. Political imperatives and timescales, particularly in the case of the CLCC within the four-year mayoral electoral cycle;
2. cost; for example, minimising costs to maximise the funds raised by CLCC for public transport;
3. phased introduction to minimise technical and usability problems, as in the case of Oyster;
4. public support based on wide deliberation with stakeholders, and direct accountability to statutory bodies such as the GLA;
5. organisational and legislative changes, such as the integration of transport under TfL and the political will behind an integrated transport strategy;

and, particularly in e-government,

6. emerging technological capabilities.

The social constraints on change in public authorities are considered in the neo-institutionalism of Fountain (2001a); yet as the discussion of e-government as a social and technical system (section 3.4) explored theoretically, and as these case studies have demonstrated empirically, the embedding socio-political situation cannot be separated from technological capabilities or from the experiences of service users as they encounter them.

This is particularly clear in the CLCC study, where value rationality and power (Flyvbjerg 2001) compete and co-operate in various ways which are manifested as a continuing series of variation orders to the detailed Scheme Order (Banister 2003), most obviously in the recent decision to extend the payment deadline. The timescale of implementation was also a crucial decider in this case, tending towards the relatively simple architecture which places the burden of responsibility for payment on the charge-payer (Government Office for London 2000) (see also section **6.1**).

In the case of the Oystercard, the implementers decided to introduce the full functionality in phases. However, as the study in chapter 5 shows, this led to the breakdown of some valuable affordances, and to antagonism on the part of some would-be Oyster users. Examples are the delay in introduction of the Daily Cap (sections 5.3.4 and 5.5.3) and the responsibility on the user to deduct Pay-as-you-go on bendy buses (section 5.2.4). An example of the usability impacts of long-

standing *political* questions is provided by the organisational separation of TfL from the Train Operating Companies, their very different fare structures, and the delayed introduction of Pay-as-you-go, blocking progress to a seamless journey for service users.

This interplay between political ideals, technological potential, and the discourses of various groups of stakeholders has been shown in the case studies, as policy and implementation have developed iteratively and inter-dependently. In this sense, policy as dialogue is an example of design-in-use; that is, design-in-use in policy design as well as system design.

8.5 Wider implications

The ways in which service users encounter the systems as dialogical inter-actions, making sense of, but also being constrained by the affordances of the systems, and the penetration of the systems in the daily lived experiences, have implications which go beyond their immediate implications for the achievement of policy aims, towards the relationships between service provider and service user, and, beyond that, between government and citizen.

In asserting, following the research questions of this thesis, that lived experiences support or detract from policy outcomes, it is recognised that, as well as cost and availability, softer factors such as satisfaction, perceptions of fairness, and trust, contribute *to* experience. These other factors are important *outcomes* in their own right, as part of *public value* (section 3.2.6, (Kearns 2004; Kelly, Mulgan, and Muers 2002)). A central contribution of these case studies is to throw light on ways in which experiences of systems *in use*, as an ecological whole and in dialogical encounters, contribute to these desirable outcomes, and to wider public policy aims.

Outcomes are not simply in the services themselves, but in what are seen by the public as socially desirable and important policy aims. In these case studies, these wider aims can be summarised from GLA and TfL documents as:

1. reducing traffic congestion and encouraging a modal change away from use of the private car;
2. encouraging behaviour change towards the use of sustainable transport through more reliable, more accessible and more easy-to-use services;

3. enabling a more convenient, more integrated transport system; and
4. increasing funding for public transport and redirecting resources into front-line services.

This section places the findings within this wider context, along three dimensions which are identified in seminal literature (Kearns 2004; Kelly, Mulgan, and Muers 2002) as sources of public value:

1. Fairness, one of the contributing factors in high quality services;
2. Outcomes, in the wider sense just defined; and
3. Trust.

8.5.1 Fairness and social inclusion

Government has an important role as guarantor of fair treatment, equal opportunities and access to key services (Kelly, Mulgan, and Muers 2002). Fairness is also part of the public perception of quality services; surveys have consistently shown that fairness, and the "*welfarist*" role of public services, is valued in the sense that there are high levels of support for the principle that specific key services should be available to all but targeted at those most in need (Kelly, Mulgan, and Muers 2002; Public Management Foundation 1996).

As a public service, public transport has particularly important implications for reducing social exclusion. On the one hand, low-income households are less likely to have the use of a private car; nationally, 53% of households in the lowest income quintile have no car, compared with an overall average of 25% having no car ownership (Department for Transport 2005)[13]. On the other hand, without adequate and affordable transport, access to jobs and basic services is restricted. People may be "*forced*" (Lucas, Grosvenor, & Simpson 2001) to own a car, even if this is a large expense relative to their income. Low-income households also spend a higher proportion of their income on travel costs overall (TfL 2002). Members of these groups do not appear to have lower need for travel, but are constrained in their travel (Lucas, Grosvenor, and Simpson 2001).

[13] However, the London boroughs have the lowest car ownership of any type of area; 39% of households have no car

At the same time, general improvements to the public transport system are only advantageous to such groups if they serve their needs (TfL 2002). This implies the need for geographic accessibility, reaching disadvantaged areas and serving key destinations such as hospitals, shops, and places of employment (Lucas, Grosvenor, and Simpson 2001), but also the need for financial accessibility. As the Oyster (section 5.3.5) and CLCC (section 6.4.2) studies showed, financial barriers are found not only to the cost of fares, but also in the requirement that users must have a bank account and credit or debit card for the quickest and most convenient payment methods, and the initial financial outlay for Pay-as-you-go or a season ticket. Conversely, Pay-as-you-go can be constructed as a means to bring the benefits of Oyster to less frequent and possibly less well-off transport users.

Especially in disadvantaged communities, acting together rather than as individuals may increase the community's capacity to achieve a better quality of life and reduce social exclusion and so extend opportunity to those who are excluded (Grimsley, Meehan, and Tan 2005). This applies not only to the use of ICTs as fora for participation, but also as technology extends access to community institutions in many ways. In the cases studied in this thesis, e-government systems might positively support a closer relation between the public and TfL as a community institution. In this respect, it is necessary to point out that the *language* of "customers", or even of "users of services" which this thesis draws from the HCI tradition, does not represent this inclusive intent, or the collective potential of public services (Kelly, Mulgan, and Muers 2002); public services are important for the *community*, not simply as a private contract between the individual service user and the service provider.

There are literacy as well as access barriers for many disadvantaged groups; internet use relies heavily on reading and a good grasp of English. As the discussion of social exclusion in the Oystercard (section 5.3.5) and Journey Planner (section 7.3.8) studies showed, these requisites are not always present for less well-off people. And this reflects, too, the cultural barriers to e-government use considered in sections 3.4.5 and 3.4.6; these communities are more likely to be resistant to technology use in general, to view technology as "*capricious*" or "*ephemeral*", as unpredictable or inevitably dangerous and unforgiving (Margetts & Dunleavy 2002).

8.5.2 Wider policy outcomes

The *outcomes* from public services go beyond the satisfaction with those services in themselves, contributing to what *the public* values as desirable outcomes, beyond the point of use.

As services develop and become more complex as well as more closely integrated into the lived experiences of service users, so it becomes increasingly difficult to identify causation of particular policy outcomes (Kearns 2004). However, this thesis has suggested some outcomes, summarised in the introduction to this section, to which these services are important contributors, and it is pertinent at this point to consider to what extent the lived experiences of services users support or detract from the achievement of these wider outcomes.

Satisfaction, trust, and feelings of fairness are important *in themselves*, but people's use of these e-government systems, and of the transport system as a whole, are only a part of their experience; they are a means, part of what Heidegger (1962) calls the "*in-order-to*" which extends to the need to get to work, to make a pleasant social visit, or as part of a holiday trip. In this way, they contribute towards the policy *aims* which are other public value outcomes.

The discourses of acceptance and resistance in the CLCC, for example, in which some people insist that they "must" drive in central London for practical reasons or because of resistance to other modes of transport, or the frustration of a traveller queuing to buy a ticket or finding that their Oystercard value has unexpectedly run out, need to be seen, not as simple interaction issues which can be resolved by improved design at the interface, but as *living* problems. They are *felt* by users responding to the system as a centre of value (McCarthy, Wright, and Cooke 2004), yet having their own values and "*oughtness*" (Bakhtin 1993) which may directly challenge the stated aims of TfL in its policy design.

When there are "breakdowns" (Flores et al. 1988), encounters with the systems distrupt the fluency of "*automatic*" (Forlizzi & Battarbee 2004) experiences. Overcoming these breakdowns, which may not be in the interface but in the ways in which the systems fail to work together, requires skill and personal knowledge.

In the cases studied, respondents have shown remarkable capacity to mix interaction with other resources, including their personal resources; however, this may hide,

from research and from TfL, serious underlying problems which detract from the stated aim of increasing convenience or ease of use. Those most affected may be the very people who are most concerned: infrequent transport users, or those who avoid public transport precisely because they find it hard to use.

8.5.3 Trust

Trust is the third of the things which the public is said to value (Kelly, Mulgan, and Muers 2002). Trust in government institutions is likely to increase public acceptance of government initiatives; conversely, good service quality and general perceptions of government competence may lead to increased levels of trust (Kearns 2004). Trust also underlies the potential for services to increase social inclusion, since services must be trusted if they are to reflect non-electronic trust networks (Grimsley, Meehan, and Tan 2005). On this basis, the findings of this thesis make a contribution to a continuing and important area which is still under-researched.

Section 3.3 presented an understanding of trust and its importance for technologies in support of public policy. The concept of "*radius of trust*" is useful in understanding trust by members of the public in government and public services. One of the questions is to consider to what extent cultural norms in a society with many radii of trust encourage trust in community institutions such as Transport for London. From the evidence of the interviews, people, with some exceptions, were generally positive in their general attitudes to TfL; that is, they feel that they share social capital with TfL. However, cultural norms in urban transport need to be interpreted with some caution, since TfL's service users are heterogeneous; some people are highly trusting of TfL, while others are cautious or neutral.

Yet regardless of their trust or distrust of TfL in general, the systems studied here show examples in which service users are *forced* to trust TfL, for example in the blankness of the Oystercard or the feelings of insecurity around payment of the CLCC. This is an example of Giddens' (1990) idea of trust in "*abstract systems*"; trust is required in the invisible symbolic value on the Oystercard, and in the expertise of those who have built the systems, for example in the correct calculation of the Daily Cap. If the trusting party, in this case the Oyster user, is unwilling to trust, then they may withdraw (Riegelsberger, Sasse, and McCarthy 2005); however, this is increasingly difficult in the face of the financial and other incentives to use Oyster.

This asymmetric requirement to trust may paradoxically weaken genuine trust in the service provider; together with other negative experiences, it may weaken the social capital which is the most solid basis for trust. On the basis of factors which Grimsley et al (2005) found to be positively correlated with trust, there is a distinct lack of "*feeling of control*", as well as challenges to personal values of privacy, in these cases.

As a way of interpreting felt-life in interactions, the findings of this thesis propose a new way of looking at the relationship between trust and *genre*, and the affordances of genres. In section 5.4.2, for example, the opacity of the Oystercard shown as an instance of the lack of the affordance of "*predictability*" (Gaver 1996:7), contrasting with traditional tickets. In the Journey Planner, some genres are said to be perceived as more trustworthy than (section 7.4.2) others. For example, person-to-person interactions, although possibly less authoritative than, for example, fixed displays, re-embed the faceless system in ways which, depending on the experience, may support or reduce trust in the system which they represent (1990).

Conversely, government should also trust citizens, and, as a service provider, should trust service users. Handy (1995) gives an example of an organisation which constantly oversees its employees; as well as being expensive to put in place and maintain, such paraphernalia of checkers, and checkers to check the checkers, *reduces* trust on the part of employees. Section 3.3.2 suggested that co-operation can be obtained by incentives to fulfil rather than by trust; but this *reliance* is at a cost, such as the cost of maintaining comprehensive surveillance or tracking systems, and hidden costs in terms of reduced trust from the other party.

The Oyster system provides a good example. Section 5.2.1 analysed the boundary between the "inside" and "outside" spaces in stations, whether or not these are separated by a physical boundary in the form of a ticket barrier. There are "insiders" - those with tickets, or those who are inside the organisation, and those who are "outside"; the "*radius of trust*" does not extend from TfL to the service user, but on the contrary, service users are required to prove their entitlement to use the system. This is not to suggest that ticket controls and barriers are unnecessary, since trust is difficult where the trusted parties are unknown and numerous (Handy 1995). Nevertheless ticket controls come at a cost, and part of that cost is loss of trust on the part of service users. It might be more appropriate to build social capital

(Fukuyama 2000), encouraging trust in users as members with TfL of a co-operative group.

8.5.4 Evaluating public value

Public value is a broader way of considering information systems than is commonly envisaged, placing them, as this thesis does, within their wider context of policy aims, policy design, and the lived experiences of users leading towards policy outcomes. Private sector companies evaluate information systems as the means to an end - increased revenue through better services and improved operational efficiency (NAO 2002b). But, to return to a point raised in section 3.4.4, government is not a commercial for-profit enterprise (Fountain 2001a; Fountain 2001b; Navarra & Cornford 2005; Traunmüller & Wimmer 2003); its aims are usually more complex than this. This does not mean that evaluation is not important or not possible.

Public value cannot, unlike evaluation metrics or commercial measures such as the "bottom line", pretend to exactness, but rather, in the multiple aims which typify public policy-making, is a rough yardstick for evaluation (Kelly, Mulgan, and Muers 2002).

Evaluation is an important and often underplayed aspect of information systems implementation. Often, evaluation is the basis for investment decisions; whether to go ahead with a particular project or to extend an existing system (Avgerou 1995) or to demonstrate value with senior decision-makers, an increasingly important function in public sector organisations (Jones & Hughes 2001).

This, though, is not the purpose of evaluation here, but rather evaluation taken on two levels: the positive and negative lived experiences of service users, and their significance in supporting the wider outcomes for TfL and the GLA. Evaluation on these levels is not simply a question of establishing legitimacy within the organisation or with the public, but of standing back and, in a systematic way (Avgerou 1995), looking at the policies, at the systems and at the experiences around them, and considering how things might be different.

In this evaluation, it is important to avoid instrumentalist and functionalist assumptions, but instead to see evaluation as a complex interplay of various human and non-human actors (Jones & Hughes 2001; Smithson & Tsiavos 2004). The approach which is taken in this thesis supports such an evaluation, rejecting any

"technocratic" (Habermas 1971) assumption of an ever more "rational", rule-based government based on technological developments.

Unfortunately, systems in support of public policy are often evaluated in the context of political demands for prescriptive benchmarking measures (Jones & Hughes 2001). As Jones and Hughes argue, "*IS evaluation must have an explicit concern for the social context and interpretive methods must be adopted which explicitly situate stakeholders at the centre of the evaluation process*" (Jones & Hughes 2001:200). Furthermore, this involvement of stakeholders must focus on their "*views, beliefs, and assumptions*".

These findings of this thesis present a challenge for policy-makers to evaluate and meet the contingent, mundane needs of service users, as Participatory Design began to do, but which now has to move beyond the workplace into the lives of citizens at home and as service users (Asaro 2000; Beck 2002; Ehn 1988). But it also begins to suggest how these challenges might be overcome. The methodology developed in this thesis, to understand the ecology of affordances as well as the phenomenology of encounters as the foundation for lived experience, adds to existing frameworks for non-prescriptive, multi-stakeholder evaluation such as those of Avgerou (1995) or Jones and Hughes (2001).

Stakeholders inevitably have different interests and different viewpoints; "external" stakeholders may be critical in the success of a project but are often overlooked in management methodologies (Farbey, Land, & Targett 1999). In an e-government implementation there are many stakeholder groups and it is hard to categorise internal from external; TfL, for example, is a functional body of the GLA (TfL 2007), so the Mayor and London Assembly are external stakeholders in a sense, but have overall control over TfL as an organisation. This thesis has not attempted to analyse in depth the interests of all stakeholder groups (but see Appendix A for an outline analysis), but does show some of the competing interests through which policy is designed. More particularly, it has re-focused attention onto the users, not as representatives on project boards (Farbey, Land, and Targett 1999) or even as participants in usability testing, but as fully-rounded human beings with a diversity of needs, values, and desires.

8.6 Lessons from the studies

This thesis has focussed on the heterogeneous users of the transport system, going beyond simple concepts of usability or user satisfaction to understand the experiences of travellers.

Realising that there are groups of stakeholders (Klecuñ-Dabrowska & Cornford 2001) with interests which compete in some ways but are supportive in other ways, the findings of this thesis hold lessons for these other stakeholders: policy-makers, system implementers, front-line staff, as well as for transport users themselves.

8.6.1 Lessons for policy makers

Policy makers, in common with other groups of stakeholders, are a broad grouping which could be broken down further. In particular, they include people whose discourses have formed part of the data for the case studies: the Mayor of London and his advisors, other politicians in the London Assembly and their competing discourses, public servants in TfL and the Greater London Authority analysing detailed policy options, and non-governmental organisations working around transport in London.

Indeed the distinction between policy and implementation is blurred, since the Mayor and his advisors work closely with senior TfL management on details of policy, while the TfL and GLA committees hold them to public account and specific changes may be formally enacted by Variation Orders of revisions to the Mayor's Transport Strategy.

The analysis which has been given here in terms of the affordances and genres of systems and on the contingent needs of service users illuminates the ways that users' experience is centred on the details of their encounters with systems in use. Providing usable systems in support of policy is not simply a case of making information available or of operating a more efficient service, but of the complex situated actions of daily transport needs.

The daily actions of service users and their acceptance of, or resistance to, change are important "pulls" and pointers to positive and negative experiences with the system. Perceptions of unfairness and unreasonableness are not simply problems to be overcome, but illuminate problems with fundamental policy design.

Continuing changes to systems in use are therefore to be welcomed. The dialogical viewpoint understands that both policy and implementation are continuous and unfinalisable. Traditional models of the decision-makers involved only in setting overall objectives and making final choices before a final implementation (Banister 2003) are inadequate, since e-government grows from policy and at the same time allows for new policies and new ways of delivering them.

However, this is not to deny the importance of careful usability analysis at all stages, but particularly in the early policy design. A fundamental argument of this thesis is that public policy decisions, often taken early in the life of a policy intervention, have lasting impacts on the lived experiences of service users.

This leads to a didactic message, familiar to HCI research (Chrusch 2000) but often neglected in public policy: usability design must be incorporated in, not added on to, systems design at all stages not only of implementation but also of policy design. As McIver and Elmagarmid have argued, "*designers of digital government would first interact directly with users in the design phase*" (2002:18).

8.6.2 Changing behaviour

In each case, the systems studied here are explicitly aimed at encouraging behaviour change, to encourage the use of sustainable modes of transport, reduce barriers to public transport use, and reduce congestion in central London:

- In the case of the Oystercard, to reduce barriers to travel
- In the case of the Journey Planner, to provide accessible information to encourage sustainable use
- In the case of the Central London Congestion Charge, to simply reduce traffic, on the basis of economic payments

Government might attempt to encourage public transport use by, for example, using its position of *nodality* and *organisation* (Hood 1983) to organise a publicity campaign or to use its authority to deter use of the private car.

There are elements of these simple behavioural incentives in the cases studied here, but this thesis has considered the *experiences* of service users and the prosaic acts of travel in London, and this level, too, has implications for behavioural change.

However, this is not a simple relation; it is unlikely to be possible to assign specific behavioural changes to specific e-government implementations, even though

changes in use of car and other transport modes have been measured in public research around the CLCC. Fundamentally, the idea that a technological system will, of itself, produce changes in behaviour is flawed; this is a well-established observation, for example in Heath and Luff's (2000) analysis of the London Ambulance Service fiasco.

For example, in the case of the JP, a central finding is that the interactions with the various channels should not be considered alone, but as part of a complex set of situated encounters with multiple sources of information. It is the ways that these do, or do not, work together, which is likely to lead to changed use of transport.

The antagonism shown by some drivers in London to the CLCC, and the contrasted high and low-tension narratives, suggest that prosaic experience with e-government is interwoven with the more obvious controlling impacts of the policy intentions; but even in this case, the issue is not one of control or even of coercion in the managerial sense (Zuboff 1988) but of creating what have been analysed as permeable boundaries of time, space, and value.

In a similar way, the Oystercard, although intended to reduce barriers to travel, creates new barriers for visitors and infrequent users, who may not be able to buy or add value to the card, as well as failures in the ecologies of affordances.

It is the interactions between technology and what Heidegger (1962) calls the "*in-order-to*" purposes of travellers which some*how* lead to change. Underlying the experiences with the JP and other information sources are experiences not only with the more or less coherent ecologies of travel information, but of the transport experience as a whole, and the personal history which transport users bring to each encounter.

8.6.3 Lessons for implementers

The interpenetrating layers of imperatives (section 8.4.5) and the enablements and constraints of the affordances of technology imply that there is not a fixed and solid boundary between policy and implementation; policy decisions have implementation implications, while the technical potential as identified by implementers informs the possibilities for policy.

The cases studied here provide some clear examples of the simplicity and complexity of the CLCC scheme and the TfL fares structure, with usability

implications considered in section 8.2.1 above. The complexity or, conversely, the simplicity of these systems arises from policy decisions, yet raises issues for implementers as well as for the transport users.

As was suggested in that section, both abstraction and transparency of interactions are needed to allow transport users to understand the system appropriately. These are implementation questions; the careful analysis of the affordances of system artefacts has shown how certain design details enable appropriate levels of understanding, while others inhibit it.

The lesson that encouraging sustainable transport use is not a simple matter of supplying information over various channels has a message not only for policy-makers but also for implementers, since change is in the details of activities in which information channels and artefacts are encountered.

Once again, this is a dialogical process, in which the *bricolage* of system users can provide useful pointers for improved system design; in this sense, the systems are *emergent* in use, co-designed by implementers and users. Users are not passive receivers of the system, but actively engage and make sense of it. For this reason, too, breakdowns in the system ecologies will be understood by them and may lead to annoyance or resistance.

8.6.4 Lessons for front-line staff and their managers

This research has concentrated on service users, external to the organisation, in contrast to much other research in experience of technology which has focussed on interactions in the workplace.

The findings do, however, have lessons for TfL customer-facing workers. From observations on stations and from interviews with TfL staff, it is notable that they have a largely unremarked, highly skilled body of knowledge, similar to the skills which Orr (1996) found among photocopier engineers.

For example, although station staff have access to the TfL "*Knowledge Stations*" (TfL 2003b) handbook and other traditional and electronic forms of information, they also rely largely on their own personal knowledge. This is so not only for knowledge about the transport network, but also for questions about local destinations and other useful information for travellers.

Staff are adept at overcoming problems with the e-government systems. The Oystercard, in particular, has unexpected features which customers often fail to understand; station staff have learned to handle these and to explain system behaviour. There are also little-noticed boundary features of the ticket gates, such as auditory signals to which skilled staff are constantly alert during the course of a front-line shift of duty.

Much of this knowledge is tacit (Polanyi 1962), or passed from one person to another informally. It forms a vital component of the transport system, which could not operate without it, and a rich, under-utilised source of design potential for policy-makers and implementers.

8.6.5 Lessons for transport users, and non-users

Finally, there are lessons for transport users; but this group of stakeholders also includes those who use the transport system infrequently or not at all. Just as bus-users, rather than car-drivers, are sometimes said to be the beneficiaries of the CLCC, so non-users of the transport system also benefit from its availability.

Transport users are inevitably the most heterogeneous group of stakeholders; frequent and infrequent travellers, visitors or residents, making journeys in central London or in the suburbs. As was pointed out in section **4.2.2**, this presents a research problem, since not all groups of stakeholders can be represented. However, there are some commonalities and some lessons for all transport users.

Perhaps the first lesson is to dispel some of the myths around transport use. Car use is not necessarily more "seamless" than public transport, because a driver has to return to their parked car (Tyler 2005). As more people do "top-up" shopping, the large weekly car trip to a supermarket becomes less necessary; and people on foot are more likely to drop into a shop in passing (Transport 2000 2005).

For many people, travel on public transport is a rather negative experience; the aim of these e-government initiatives is in general to make the experience more positive. But transport experiences have the potential to raise strong emotions; this is true for both private and public transport, but is not often considered by transport planners. The feeling of irritation at some design breakdowns in the system is not simply an internal emotion; as Dewey (1929; 1934) noted, emotions are centred on physical interactions with material objects.

Openness to dialogicality suggests that system designers at policy and implementation levels will be close to the service users and will respond to their needs. Reciprocally, systems should be open to the unexpected potential of the ways in which they are appropriated in practice. Making systems available over multiple channels goes some way to meeting users in their own world, but it is the ecologies across and between channels, transport modes, and interactions of many kinds which allow for the contingencies of daily life. The final lesson for service users therefore is this: appropriating systems in use, adapting them to undesigned needs, and taking whatever is to hand to meet the requirements, is not a mis-use of the system. On the contrary, information systems should be designed to allow such *bricolage* and design-in-use.

8.7 Conclusions

In drawing together the findings of the case studies, this chapter has justified from empirical research the assertions which were made theoretically in the conclusions to the literature reviews. Experiences with e-government grow not only from the technology implementation, but fundamentally from the policies on which systems are based; implementation and policy are not separable.

Conversely, users' lived experience has implications for the achievement of policy, in obvious and less-obvious ways, in terms of the simple concept that antagonism to a policy may be increased by a poor user experience, in the situated and transient interactions with e-government services, and in the way these are incorporated into daily life.

This is a fundamental rejection of the Cartesian, dualistic, view of information with which this thesis opened (section 1.1); rather than service users rationally engaging in systematic thought of which information systems are a simple reflection, the ends and means of policy implementation are inter-twined and mutually constructive.

Chapter 9

Review of the thesis and final contributions

This final chapter recalls the motivation and the contributions proposed in the introduction to this thesis. The methodology, and lessons learned from applying it to these case studies, are then subject to a critical review. As a final contribution, three *hypotheses* arising from this research are presented, and the thesis ends with suggestions for future research building on the work presented here.

The primary motivation for this thesis is the desire to focus on the *users*, citizens, customers, consumers or e-government. This initial interest was strengthened by two imperatives which became more evident from a careful review of the existing literatures: 1. the urgent need to bring the user into the centre of *public policy* research and 2. the increasingly recognised importance of *felt life* in relations between people and technology (McCarthy & Wright 2004; McCarthy & Wright 2005a).

This research took place at a time of rapid and significant change in an area of local government: the re-establishment of a London-wide assembly and Mayor, and, following this, of a transport authority gradually extending towards unified oversight of all transport modes in the capital. This is also in part a response to the recognised "*transport crisis*" (GLA 2001f:Para 3) in London, and has led to some high-profile interventions such as the Central London Congestion Charge, as well as some less remarked initiatives such as those which form the basis for the other two case studies in this thesis.

This set of circumstances is the foundation for this research and for the contributions and findings which are revisited in the following sections.

9.1 Contributions

9.1.1 Revisiting the research questions

Recall here the research questions as they were articulated in chapter 1:

1. In what ways do policy decisions, as part of the design of policy manifested in the developed systems and experienced by users, lead to positive and negative experiences in the lives of users of the systems?

2. Conversely, in what ways do positive and negative perceptions in the lived experiences of users of the system contribute to, or detract from, public policy objectives?

The central contribution is to consider the lived experiences of people who use e-government systems as part of their daily activities. e-Government is part of *government*, and indeed the ubiquity of electronic systems in support of policy questions the separation of e-government from policy as a whole; so this thesis is fundamentally concerned to examine the boundaries between policy and implementation and the ways in which these shifting boundaries are experienced in the lives of those who encounter them.

So the initial expression of the questions asked by this thesis is a little too essentialist, a little too given to the assumption that usability and public policy are two different things; a *dialectical* rather than a dialogical approach. And this is borne out by the empirical findings, and is one of the lessons for policy-makers suggested in section 8.6.1.

The research questions imply certain assertions, which in turn are investigated empirically in the case studies:

1. to assert that there is a general principle that usability implications are part of policy design, and cannot be added on later;
2. that the lived experience with e-government is crucial to the achievement of policy objectives;
3. the need to trace carefully, in empirical research avoiding essentialist assumptions, some examples of lived experience in practice;
4. the need to understand the whole user experience, not only as situated action but also for its intrinsic as well as extrinsic meanings and emotional/volitional impact.

The focus is on the lives of citizens as users of public services, within the context of transport policy; this is "G2C", not "G2B" or "G2G" (Government-to-Business, Government-to-Government), although that acronym hardly does justice to the central importance of "consumers" and their experiences with government, e-government, and public policy.

To revisit the questions and summarise the ways that the findings answer them, it is useful to refer back to the initial understanding of the relations between public policy and lived experience, as expressed in Figure 9 at the start of chapter 4 (section 4.1.1, page 96). Design, manifestation, experience, and outcomes each overlap in the diagram, and it is in these *overlaps* that this thesis makes its contributions.

In *public policy design* and *manifestation*, this overlap reflects the political imperatives, competing stakeholder interests, and changing technological possibilities. The "garbage can" metaphor (section 5.5.47, (Cohen, March, and Olsen 1972)) has been used in the Oystercard study, not in a pejorative way, but to indicate the ways in which technologies may become useful in the context of political and other technological changes.

The overlap between *manifestation* and *lived experience* contains *systems*, political, legal and administrative, as well as information systems, for example enforcement of the CLCC and the constantly-changing TfL fares structure; and it contains *artefacts* such as the Oystercard, traditional tickets, and many different kinds of information resource, which may also be interfaces to the systems; and it contains *street-level public servants* who mediate between users and the systems and may overcome some problems in the interfaces.

Within this overlap are the many ways in which ecologies may or may not "work together", as well as implications for social inclusion, since systems which assume high levels of literacy, language skills, or access to financial resources, are less accessible to some disadvantaged groups.

Finally, within the overlap between *experience* and *outcomes* fall many of the issues which have been raised in the lived experiences of service users. Satisfaction, high-quality services, and a sense of fairness, are all *part of* public value, the yardstick which is used here to assess outcomes. It is probable that they are also contributors to wider outcomes, such as changing behaviour and, ultimately, providing a better environment and more economic gains through more sustainable, less congested transport. However, this thesis is more concerned with the antagonism and frustration, on the one hand, or enchantment, on the other hand, engendered by these experiences. If behaviour change is the only consideration, this could be encouraged

by more co-ercive means, as the CLCC and Oyster studies have shown; but at the cost of reducing other sources of public value, fairness, satisfaction, and trust.

9.1.2 Summary of contributions

The relevance of usability to policy acceptance, and conversely the implications of policy for usability, is not, in itself, a particularly new insight. At a relatively simple level, the report into trials of enhanced technology for detection and enforcement of the CLCC (TfL 2005h), for example, recognised the importance of "user-friendliness" for public acceptance of the scheme.

However, these are rather superficial examples. This thesis takes these ideas and deepens them theoretically and empirically. In this, it is a synthesis of e-government research with emerging research into ways in which technology is increasingly encountered and experienced contingently, in passing, but as part of daily routine, expanding this research beyond the workplace or home into the public space. The contributions are united by this fundamental aim: to build on movements in HCI research, extending these into the field of e-government, and in this way to bring insights from the HCI tradition to throw new light on open questions on e-government in public policy.

The theoretical and empirical contributions are summarised:

1. Development of the theory of experience with technology; affordances as the limit of the social and as a "lens" to understanding interaction (chapter 2);
2. review of e-government as a socio-technical system; the inter-actions of policy and usability in e-government (chapter 3);
3. empirical research of users' experience with e-government; analysis of policy and interviews with policy-makers and implementers (chapters 5, 6,and 7);
4. analysis methodology, from phenomenology to Discourse Analysis and Grounded Theory (chapter 4);
5. commonalities across the studies, didactic messages and lessons for stakeholders (chapters 8), and, finally, some emerging hypotheses as a basis for further research (this chapter)

The remainder of this section elaborates on these contributions.

9.1.3 Theoretical development: encountering e-government in practice and experience

The practice theorists have convincingly demonstrated that interactions with technological systems are not simple exchanges of information or cognition between humans and computers. However, McCarthy and Wright (2004) and others have shown the need to go beyond this realisation; as technology extends into more and more areas of life, so it becomes more entwined with lived experience in ways which may be more or less *enchanting* (McCarthy & Wright 2003).

This thesis extends this new understanding into the area of e-government, and to the relationships between policy and its representation in electronic systems.

The relationships between policy and technology are fundamentally part of the debates around the relationships between society and technology. This thesis has also drawn on this research tradition, and makes a contribution to it. In chapter 2, the concepts of affordances (Gibson 1977; Gibson 1979; Norman 1988; Norman 1999) as the limit of the dichotomy between the social and the technical, and of genres in the cultural interpretation of affordances, is the basis for an understanding of society and technology which "*takes technology seriously*" (Grint & Woolgar 1997:10). This understanding provides a lens for showing in what ways these interactions are ready-to-hand or leading to "breakdowns", transparent or hermeneutic, aesthetic or unsatisfying.

Chapter 3 considers various approaches to the support of policy by information systems, including ways in which citizens might be encouraged to change behaviour. Transport policy addresses issues of vital importance to the urban economy as well as to the grounded experience of living or visiting the city. London exemplifies the twin problems of urban transport, traffic congestion and under-resourced public transport, alongside an urgent need to ensure sustainable transport use (GLA 2001f). e-Government is seen as an essential part in encouraging people to use public transport and sustainable modes more and their cars less.

These ideas join together in a critique of a simple policy-outcome model. Seeing interactions with computers as emotional-volition experiences starts to deepen our understanding of the ways in which technology can support policy, beyond such essentialism.

9.1.4 Empirical studies: mundane interactions outside home and workplace

In basing this research on a fundamental aspect of urban living, transport, in a single major city, London, the thesis has deliberately taken a mundane application area, in which the situations of use are central to daily experience but the information systems to support them are, for the most part, peripheral to the traveller's experience.

Although prosaic, transport is capable of relating to strong emotions; as Post relates from his personal experience, "*a technology can be tied to 'deep meanings and powerful emotions' ... people are capable of loving all sorts of contrivances, not least railways*" (Post 2003:206-208).

The interactions studied here are interwoven with contingent activities of everyday life; and this is increasingly the case, as computers reach out into more and more areas of life. Hassenzahl's (2003) concept of multiple small goals in *action* towards the larger goal goes some way to understanding the complex contingencies of daily life and their implications for interaction in situated practice.

Although not often considered as an area of e-government, transport is a central policy area, especially in urban government, as discussed in section 3.5.3. The introduction to this thesis referred to "*London's transport crisis*" (GLA 2001f) and to the part which electronic systems can play in overcoming it. These case studies between them cover all of TfL's major e-government projects (TfL 2004j), with the exception of *Countdown*, an information system for buses which is currently unreliable but for which the infrastructure is being upgraded (TfL 2005e).

In this research, the focus is on *users* of public services, who may be citizens but, whether they are or not, relate to government in a special way: it is in their name that policy is ultimately legitimised. Unlike many earlier socio-technical studies, these encounters with technology are outside the workplace (although they are often on their way *to* their workplace). Their encounters are transient and in passing, but frequent, repetitive, and essential for their larger goals.

9.1.5 Methodological contributions: ecologies, narrative, and experience

This thesis has opened the analysis of each of the three cases by looking first at the hard physicality of the encounters, considering these as ecologies of affordances and

genres; then in practice, understanding how systems fit with the situated needs of service users. The constraints and enablements of systems in practice are then shown in the lived, emotional and volitional experiences of service users.

To build these analyses, a case-study approach has taken multiple data sources: policy documents, artefacts, observations both in a laboratory and situated in Underground stations.

However, the primary data streams drawn on in this thesis are discursive:

- interviews and focus groups with service users
- public discourse of policy-makers
- formal policy documents
- interviews with staff and other central opinion formers

These data streams have been thoroughly analysed on a deep level for their meanings and implications for the lived experiences of transport users. In particular the discourses of service users have been analysed using Discourse Analysis and Grounded Theory based on the understanding that discourse and experience are linked, going beyond cognitivist assumptions about behaviour (Potter & Wetherell 1987).

Narrative and experience are intertwined because thought and language are inextricable; "*our experience of human affairs comes to take the form of the narratives we use in telling about them*" (Bruner 1991:5). This thesis goes beyond practice to begin to uncover experiences with technology; and in this respect, basing experience in discourse as the "*semiotic elements of social practices*" begins to grasp "*the richness and complexity of social interaction*" (Chouliaraki & Fairclough 1999:38).

It is in the light of a phenomenological search for the essence of experience that the ways in which these systems are encountered have been *deconstructed*, to borrow an idea from literary theory appropriated by Dix (2003b), by the analytic devices of affordances and genres. Dix is concerned to deconstruct experiences which are normally conveyed using one medium in order to suggest how the experience might be reconstructed in a new medium. Yet this kind of abstraction is not only a tool for design of new artefacts, but also a "*resource for creativity*" (Dix 2003a:2; Gaver 1996), for honing ear and eye to reinforce the aesthetic senses, for making familiar

actions "*anthropologically strange*" (Garfinkel 1967:9) and opening them up to ethnomethodological analysis.

The differences between the physicality of media present different affordances for *social* interaction, a point which is only hinted at by Dix but is made clear by Gaver (1996). To deconstruct experiences on the basis of analysis of affordances is therefore also to deconstruct the borders between the social and the physical. Deconstruction is a way to "*cut against the reification of design*" (McCarthy & Wright 2004:195) based on unexamined assumptions about the location, properties, malleability and permeability of these borders.

It might seem that the concept of affordances has been stretched rather far in this thesis; certainly far beyond Gibson's (1977; 1979) conception, with its emphasis on immediate perception. However, the interests of this thesis are rather different from Gibson's concern with perception. This thesis develops the idea of ecologies of affordances and genres, and asks: how is it that various artefacts work *together* to enable and constrain action, and how are these possibilities for action experienced in the lives of service users? The analysis has been found to be fruitful in answering questions about encounters between people and computers in *situated life*.

9.1.6 Commonalities across the studies: oughtness and emotion in prosaic acts

It has been recognised since, at least, the opening up of technological studies to social shaping (MacKenzie & Wajcman 1999) that there are social tensions between conception and implementation of technology (Fleck, Webster, & Williams 1990; Williams & Edge 1996) and sometimes resistance to technologies in use (Markus 1983b; Wilson 2003). A corollary is that the boundaries between policy and implementation are blurred.

A traditional model of development would proceed from policy through analysis to design and implementation. The findings of the case studies add to the weight of literature which challenges this model; people adapt and combine artefacts in forms of *bricolage*, responding to unplanned, contingent situations. This is "*in-use*" *design*, emergence as people encounter technologies and "*imbue them with their own new meanings*" (Cornford 2003:2; Lin & Cornford 2000), but it is also dialogical, even playful, in which "*means and ends are simultaneously created*" (McCarthy & Wright 2004:194). And these dialogical acts by service users are in

turn reflected in continuing policy changes; in the extension of the CLCC payment deadline, and in the details rules about the use of Oyster, for example.

Although encounters are in passing as people travel through the city, this does not necessarily imply that the tension between policy and its implementation is transient. Travelling in London and encountering various technologies is emotional and volitional, for example in the dislike of the heat of the Underground, or the frustration of being on a bus which is stopped in traffic; the way some drivers see cameras as a "*taunt*" whereas others give them a "*little wave*" as they pass.

These emotional conflicts have been analysed in this thesis in terms of *antagonism* (Laclau & Mouffe 2002). Although these antagonisms can to some extent be overcome by policy changes, there remain unfinalisable questions about what constitutes fairness, about responsibility passed down to service users, and about what is reasonable.

Understood from this viewpoint, breakdowns are blockages in which the *person* is prevented from fully being-a-transport-user or being-a-car-driver, and this is therefore a challenge to the person*hood*, that is, to the "*morally responsible agent*" (Hicks 1996:106), the person with an emotional-volitional character (McCarthy & Wright 2004). In Bakhtin's (1993) terms, this is the *oughtness* of acts, the person as responsible for responding to their concrete situations; "*the unique and unified event of being*" (Holquist 2002:24). Being is a process of committed *becoming*, in the unrepeatable events of daily life.

9.2 Critical review of the approach taken

This thesis starts from a commitment to focussing on technology in the everyday lives of system users and to their experiences. These experiences are understood in terms of the physicality of the interactions, the meanings for those who encounter them, and the aesthetic and emotional responses they engender (McCarthy & Wright 2004; Wright, McCarthy, and Meekison 2003).

Section 4.2 distils this commitment to three basic propositions:

1. a commitment to an interpretive approach;
2. a commitment to taking seriously the artefacts of technology; and
3. a commitment to the centrality of the felt life of service users.

It is appropriate, in this concluding chapter, to review these propositions and to consider to what extent they have been fulfilled, to critique and to justify the overall approach and specific decisions taken in the research design.

9.2.1 Basing experience in narrative and discourse

Although diverse data sources, a reflective analysis, and a deliberately broad-based methodology underpin this empirical research, direct observations *in situ* form a relatively small data source in this thesis. It is, however, a long-standing argument of researchers into situated action and ethnomethodologists that retrospective interviews, contrived examples, or pencil and paper observations cannot capture just those "*fleeting circumstances*" which are the objective of situated action (Suchman 1987:109).

But the primary interest of this thesis is in understanding the *experiences* of service users. Experience is also filtered through the researcher's ability to interpret; there is, as Geertz says, no "*magical intrusion into [the] consciousness*" of another person (1986:373); such understanding as is possible is gained through their expressions, "*representations, objectifications, discourses, performances, whatever*".

Recognising this, and in contradiction to the practice-theorists, this thesis has turned to a critical analysis of textual data, using the tools of Grounded Theory and Discourse Analysis. This critical analysis goes beyond taking accounts as unproblematic resources for understanding. Intent, as expressed in *post-facto* accounts, is inevitably post-rationalised; tacit knowledge is made accountable, sedimented knowledge is brought to the surface. The fullness of experience at the time and place of enactment is not directly available; but it is not necessary to assume truth "really in the data", if accounts are treated as *constructions*.

The Discourse Analysis of Potter and Wetherell (1987), itself inspired by the re-focussing of social science towards discourse by Gilbert and Mulkay (1984), avoids assumptions about internal cognition, belief, and attitudes. Rather, it is concerned with the constructive nature of accounts in discourse. This thesis is not based on the pure form of Discursive Psychology (Potter 2003) which would reject the mixing of discourse analytic with other analyses. However, it is not necessary to accept the strong form of constructionism in order to find valuable resources in

Discourse Analysis, for example in the realisation that recounting an experience is also to an extent to construct it.

It is in weaker this sense that Discourse Analysis, and Grounded Theory up to a point, have been drawn on in this thesis. The interest is not socio-linguistic in the way of most discourse analysis; the interest it to use Discourse Analysis to uncover experience, but underlying this is an important awareness that experiences are both constructed and recounted in discourse.

9.2.2 The value of open interviews

A second possible criticism is similar: the use of interviews and focus groups as discourse rather than a corpus captured in the wild (Orr 1996). Potter (2004) in particular has considered the ways that interviews and focus groups abstract participants from the situation, and orients them instead to the social science agenda and their position as informant.

Relating discourse captured as data to its *context* is a problem with which all who use discursive methods must grapple. Light's (2006) suggestion of encouraging participants to enter a "*state of evocation*" is a promising avenue where the interest is in a specific set of interactions. In some ways the depth interviewing used here had some aspects of this method, with the researcher attempting to aid participants in their recall of events.

The application of Light's (2006) method to HCI is a new approach; but the searching, barely-structured interview remains a powerful tool for uncovering complex *stories*, the interweaving of interactions with life, and *feelings*, as well as the intentions of people who encounter technology.

The traditional textbook view is that semi-structured interviews are a prelude to more extensive questionnaire or quantitative research (Oppenheim 1992); according to this view, interpretive research is mainly useful in *identifying* issues. As the methodology chapter (in section 4.3.1) has made clear, the case-study approach adopted in this thesis does identify issues which are emerging in this new area of research, but nevertheless stands in its own right. A similar point is made here regarding the use of interviews. Open-ended interviews are of value in themselves, since they provide new examples of usability issues throughout the research, while avoiding as far as possible the narrowing which questionnaires inevitably involve.

The CLCC research provides an interesting side-light on the use of interviews: although much of the data capture was in the form of a questionnaire, this was conducted verbally and face-to-face rather than in written form; these interviews were voice-recorded (and in some cases also video-recorded) and transcribed. Although these interviews were closely structured, they nevertheless formed rich discourse which provided some unpredicted findings.

9.2.3 Different discourses, different analyses

The third area of possible critique is in the *analysis* of discursive data. The use made of detailed analysis of discourse at the level of text for interviews and focus groups, but at the level of meaning or discursive formations for elite interviews and policy documentation, might seem inconsistent.

This analytical detail is a reflection of a much wider debate between those who see Discourse Analysis as primarily textual (Fairclough 1992; Fairclough 2001; Potter & Wetherell 1987; Wetherell 1998) and the Foucauldian tradition which explicitly rejects the "*turn to text*" (Foucault 1971; Hook 2001).

An approach which draws on both of these understandings of discourse is provided by Critical Discourse Analysis, and in particular Fairclough's Text Oriented Discourse Analysis (TODA) (Fairclough 1992); but, although influenced by Foucault, Fairclough emphases the centrality of detailed analysis of spoken and written language.

However, the interests of this thesis have moved away from Fairclough's concerns with power and ideology expressed in text. This suggests a moving away from text-level analysis of policy, while retaining this level of analysis for the spoken discourses around the experiences of service users.

The discourse analysts raise important questions about the realist assumptions which underlie traditional research, qualitative as well as quantitative, and Discourse Analysis provides some practical as well as theoretically-sound methods for investigating the construction of society in language. The fundamental insight and interest is in the close relation between social practices and "*the language we use to describe them*" (Taylor 1987:53), or, in Foucault's terms, of discourses as "*the practices that systematically form the objects of which they speak*" (Foucault

1972:54). This understanding, and the wider "interpretive turn" (Rabinow & Sullivan 1987) has enormous consequences for social research.

This is an important insight from socio-linguistic research, but, at the risk of sounding repetitive, it is not the focus of this thesis; the interest here is in text *and* context, in the lives of service users *and* their encounters with the discourse-constructed policies embodied in e-government information systems.

9.2.4 Representativeness of samples

The final possible criticism must be addressed briefly. As has been pointed out in section 4.2.2, the users of the London transport system are transient and heterogeneous. The samples used in this research cannot be considered to be representative of all populations of service users; in particular, visitors and new arrivals in London are under-represented, despite attempts to recruit individuals from these groups.

What can be claimed, though, is that the narratives given here are accounts of realistic and normal experiences of a variety of service users, and are suggestive of problems and enchantments with the service which affect all who encounter it.

9.2.5 Validity

The theoretical basis on which this thesis demonstrates its validity are discussed in detail in section 4.7. The purpose of this sub-section is to review, in the light of the empirical findings, the achievement of validity on this basis.

The variety of cases, each different in terms of the ways the systems are encountered and the intentions of the users, yet united in terms of their overarching aim to support the GLA transport strategy, and for the user in terms of their daily transport needs, allow for different perspectives. The claim here is not that multiple sources of data and varying cases provide triangulation in the positivist sense, but that they provide both commonalities *and* contrasts; the commonalities are notable for the *differences* in the different situations as much as for the abstractions which they share in common.

Fundamentally, this thesis claims its validity on the basis of the clarity of analysis and the presentation of arguments, following the Discourse Analysis tradition, with presentation of sufficient data in the report to justify the findings (Wetherell & Potter 1988); this data is expanded in the appendices. In particular, following Potter

and Wetherell's suggested tests of validity (section 4.7.3), the analyses are *coherent*, and, in their application of McCarthy and Wright's (2004) insights into the significance of dialogical and pragmatic approaches for experience into new areas, the findings meet the criterion of *fruitfulness*.

It is important to note that there is no generalisation to overall *populations* suggested here; it is possible that the findings would be different in other application areas, in other cities, or at different times. Already the timeframe has moved on; usability issues uncovered in these studies have in some cases been addressed. What is suggested, however, is that a number of *well-founded hypotheses* can be drawn from these cases, and that consistency across cases, analysis methods, and data samples provides good support for these hypotheses.

9.3 Relating the methods to the theoretical framework: some reflections

The research questions presented in the introduction in section 1.2 are developed into a theoretical framework in chapters 2 and 3, and unpacked in the introduction to the methodology, section 4.1.1; the relationships between public policy, technology implementation, usability, and lived experience are elucidated in a diagram.

It is important to be clear that these are not simply "how" questions, but as "in what ways?". This leads to research tasks which can be summarised as requirements to:

1. unravel the interplay of many factors in policy design;
2. elucidate how policy design is "manifested" in e-government systems;
3. show some ways in which policy decisions "lead to" incidents and activities in the lives of service users;
4. understand these incidents and activities as lived experiences of people;

and

5. show in what ways these experiences may impact on the achievement of policy objectives.

Section 1.4.2 presents the outline of the ways in which this is to be fulfilled, on the basis of four *strands*, each of which is a strong theoretical tradition for throwing light on these questions: the ecological, phenomenological, dialogical, and pragmatic strands.

These four strands are applied to experience viewed along three "axes" (section 4.2.1):

1. physical encounters;
2. their meanings for service users; and
3. the emotional, or felt-life, qualities of experience.

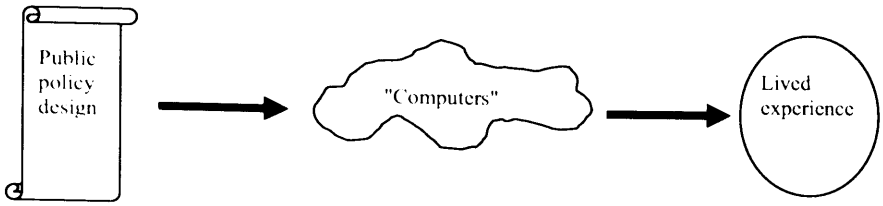
By "axes" is not meant three separate, measurable Cartesian co-ordinates, but rather different viewpoints which must be drawn together for a rounded picture.

Addressing these research questions, then, is not a process of generating and analysing measurable quantities and finding causal connections or correlations between them. This implies a commitment to an interpretive approach. It is based on the understanding that information systems are not programs which are simply followed by service users, but resources for situated action; the research, too, must be similarly situated, but must also place the situations within the wider, unfinalisable contexts of policy need and the users' own lives.

9.3.1 Meeting the research needs: basic approach

How well do the research methods meet the research framework, and the research needs as outlined above?

To begin the reflection on this question, recall that each of the cases is presented with findings in three inter-related areas. *First*, an ecological analysis was made of the system, as encountered by service users. *Secondly*, drawing mainly on their narratives, the experiences of these with the technology were analysed. The ways in which experiences are related to particular aspects of policy are suggested at this stage. *Thirdly*, the development of policy design was traced; interviews with key staff and analysis of documents are important sources of data here. *Finally*, but perhaps most significantly, this was related to the experiences of service users, in terms of implications for policy. In other words, there is a bracketing, for the purposes of practical research:



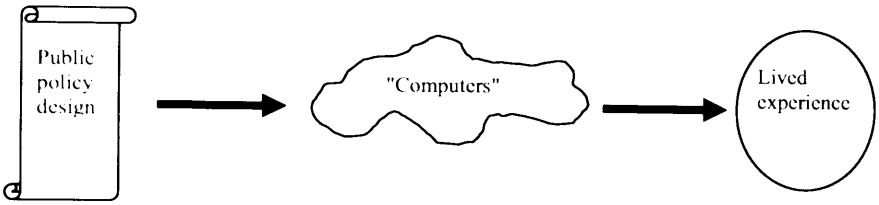
What does this:

Experience with technology, from HCI and especially technology and lived experience research

Tell us about this:

Experience with technology in support of public policy

But, the chapters then go on to investigate how public policy is formed, and how it, in its intent and in its actuality, relates to different kinds of technology and thence to the lived experience:



How does this:

Technology in support of policy aims

"Lead to" this:

Experience with technology in support of public policy

Arguably, this "splitting" of the questions into two "parts" runs counter to the ontological basis of this thesis; a dialogical understanding sees that interactions between service providers and users are not a dialectic between authoritative and resistant voices, but a continuing dialogue between "selves" and "others". In the tensions which surround the design and appropriation of public policy and technology, the different groups of users are a constant presence; this is one of the major shortcomings of a determinist view such as that of Winner (1986). Thus, at a

certain level, negotiations around which e-government systems are constructed are tensions between different "*relevant social groups*" (Bijker 1995); e-government systems are socially constructed, but in situations which are more overtly politically charged.

9.3.2 Combining the incommensurable? Discourse Analysis and Grounded Theory

One way of considering the questions without "splitting" could have been to compare the discourses of policy-makers with those of service users and others. Indeed, such an approach was considered in an early conceptualisation of the thesis. In so doing, the approach would have been along similar lines to those of Wilson (2003) and Brown (1998), using narrative voices in multiple accounts of the same underlying story.

However, while this approach has proven useful *within* an organisation, there are simply too *few* points of commonality between the narratives of service users and those of service providers to allow for such a commonality in the treatment of the data. Thus, while within an organisation there may be a "*rhetoric of enrollment*" (Wilson 2003) which may be accepted or resisted by various groups of actors, any such rhetoric is a relatively small part of the service provider/service user relationship.

For this reason, although narrative analysis is a feature of the analysis of the experiences of users, *Discourse Analysis* in its various forms is in the end a rather small part of the analysis, and hardly features at all in analysis of documents or of interviews with key staff. "Pure" Discourse Analysis regards discourse as the primary medium of action, as in the Discursive Psychology of Potter, (2003), justifying "*a resistance to taking the (seemingly) sensible course of attributing distinctive qualities to categories of actors and using what people say as a source of information.*" (2003:784). On this basis, Discourse Analysis would seem to have little application outside of sociolinguistics; Alvesson and Sköldberg (2000:245) are succinct in pointing out the problem with approaches which discount the extra-linguistic: "*[l]inguistic reductionism ... does seem pretty narrow and sterile*".

There are those, such as Potter, who reject the mixing of Discourse Analysis with other (according to them, incommensurable) analyses. Yet, if research is to respect the non-representational character of language; if it is to recognise that language is

not objectively describing a pre-given "object", but constructing it; and if it is to doubt, in a positive way, the notion of "real subject" who can report simply on experiences as "real events", then some sort of analysis of discourse must be undertaken, within other forms of analysis; failure to do so can lead to circular or simply inaccurate analyses.

To avoid reaching an impasse of "linguistic reductionism", the thesis looked to Grounded Theory as an approach to building new theoretical insights. It is hard (and perhaps unnecessary) to pinpoint exactly where the boundaries between Grounded Theory, Discourse Analysis, and Narrative Analysis have been drawn. However, it is a reasonable summary of the way the analysis processed to say that Grounded Theory-style coding was important in identifying sensitising concepts, and the openness of Grounded Theory enabled the gradually building of the theories around contingent life, ecologies of experience, and their relationships to public policy.

Later, misgivings about Grounded Theory expressed in section 4.3.3 (and what Alvession and Sköldberg (2000) class as its rather uncritical attitude) led to a revisiting of Discourse Analysis, but in a looser, less theory-heavy style. It is unfortunate that the Strauss and Corbin (1998a) version of Grounded Theory has become so much more well-known than others. The potential of Grounded Theory for non-positivist, sensitising research, and as a basis for other levels of reflexivity and abstraction, opens up to the researcher a set of helpful literature from those who have trodden this path before (Charmaz 2006).

But Grounded Theory without reflexivity is also emblematic of a possible danger with coding: once discovered, a code may lead restricted thinking and corroboration rather than reflexive thinking. So Grounded Theory, and data-centred analysis in general, needs to be taken with other more reflective methodologies, The statement in section 4.3.4 that the thesis regards discourse as both a topic *and* a resource seems, in retrospect, to downplay the positive virtues of such an approach; such a multi-paradigm multiplicity of viewpoints should be seen as potentially very fruitful.

9.3.3 Towards a reflexive interpretation

Being reflexive implies continually questioning not only the analysis, but the fundamental ontology on which research is founded. However, this does not mean

that well-established, and often very illuminating, methodologies founded on different ontological assumptions have to be discarded.

One possibility for combining useful approaches across paradigms is the *reflexive interpretation* of Alvesson and Sköldberg; drawing on the example of Giddens' "double hermeneutics", that is, "*the interpretation of interpreting subjects*" (Alvesson & Sköldberg 2000:247), they propose a "*quadri-hermeneutics*" of interpretation, going beyond *reflection* to *reflexively* re-reflect different levels of interpretation.

Their four levels, which, they emphasise, are not a fixed recipe but rather, one possible variant of reflexive interpretation, are:

1. the empirically based (Grounded Theory and Ethnomethodology);
2. the hermeneutic;
3. the ideologically critical (as in Frankfurt School critical theory); and
4. poststructuralist-postmodernist.

The point is that the interpretation is multidimensional and dynamic, avoiding the domination of any one viewpoint and encouraging re-thinking of emerging ideas.

It is interesting at this point to recall that, at an early stage, the development of this thesis was influenced by Habermasian Critical Theory and Marcuse (Habermas 1971; Marcuse 2001), by Ricoeur's hermeneutics (Ricoeur 1977; Ricoeur 1980) and by poststructuralism such as that of Foucault (1982) and Kristeva (1974), and by a strong interest in discourse theory (Laclau & Mouffe 2002; Torfing 1999).

It cannot be claimed, however, that the analyses in this thesis are informed by the reflexive interpretation in the structured way proposed by Alvesson and Sköldberg (2000:247). As well as providing some elegant insights into qualitative research generally, their approach could have strengthened the analysis in several ways. For example, the Oyster study (Chapter 5) attempts an analysis of the fundamental need for a ticketing system and why people are travelling at all, often for work but not as part of their paid work; this analysis could have benefited from an overt Critical Theory viewpoint, or from a Foucauldian analysis of power discourses.

A stronger version of reflexivity would force the researcher to openly challenge the emerging analysis at various stages; a "*temporal breaking out of a chosen research*

style" (Alvesson, Hardy, & Harley 2004:17). This should be a combination of *De-stablilisation* and *Re*-construction, re-framing, re-presentation, re-claiming. For example, the analysis in the Oyster study of users' experiences could question why certain incidents are said to represent *frustration* for travellers (section 5.3.1): why this categorisation, and not others? Are there other ways to interpret this data? Are the interviewees reporting incidents of "fact", or are they also constructing the service provider, and constructing *themselves* in relation the service provider in various ways? What hidden assumptions underlie this way of seeing the data?

Making a space for reflexive interpretation in this way might mean breaking *out* of a focus on the text or it might mean temporarily breaking *into* a deep textual analysis. This might, as in this thesis, be a form of Discourse Analysis, or more hermeneutic methods, looking between part and whole, text and context, between pre- and post-understandings, and trying to use the text, or action as text, to uncover meanings and to empathise with the subjects.

9.3.4 Understanding experience: other possible approaches

The approach taken in this thesis to understand lived experience, despite (or perhaps because of) its basis in narratives of service users, does not lack of empathy and feeling, but can be seen as being rather two-dimensional, not quite having the sense of *livedness*.

Time is an underlying, but mostly unremarked, element in experience. Time is not overlooked in this thesis; for example, the changes in the system over time point to the unfinalisability of the constantly changing systems. But the service users, too, are changing over time; there is a "before" and an "after" in their use of the services, as well as changes in other aspects of their lives.

One way to capture some of this sense of time would be to use pre- and post-use surveys, interviews, or focus groups. However, to dig deeper into the users' own experiences, to make sense of them as to try to see them as the users do, while also encompassing change over time, a longitudinal, in-depth study with a small number of subjects, perhaps including a long-term participant observation as well as interviews, would avoiding the shortcomings of retrospective accounts while keeping a qualitative, interpretive approach.

Such ethnographies have much in common with the literary genre which develops depth in characters and change over time, that is, the *novel* (Bakhtin 1981); a number of researchers have proposed a literary way of thinking to "*open up space for the Other*" (Alvesson, Hardy, and Harley 2004:10), to become open to other readings, and to engage more directly with their research subjects (Wright & McCarthy 2005). A variant of such literary techniques is the use of auto-ethnography, or research diaries which may be part of the researchers' development of theory or may be published in their own right in a more or less confessional style (for example, (Schultze 2001)).

9.3.5 Interpretation of the data in this thesis

This section ends by linking "what was actually done" to the justification of the findings, to relate the data to the final thesis. It must be emphasised that the questions asked, the analysis around the ecologies, the phenomenology, the pragmatic finding of experience in mundane life, and dialogical interaction with systems in use - all of this was developed *from* a close reading of the data, as it developed and in an iterative process.

For example, an early observation was the importance of contingencies and the way in which interactions do, or do not, fit into the users' mundane needs. This realisation led to further coding and re-coding according to categories such as "mundane contingencies", memo-writing, and joining of codes around this idea which eventually developed into the "ecological" thinking around the ways in which the "system" hangs together.

Other codes, to borrow a more cognitive language, categorised what could be classified as emotional states such as "antagonism", "fairness" or "personal values"; and this coding was repeated several times, with new insight on each iteration. Each case study chapter attempts to show the process of analysis and each has a corresponding appendix showing stages of coding, bringing codes together, and analysis.

9.4 Some emerging hypotheses

This thesis has not taken a positivist, hypothesis-testing approach, allowing instead for an understanding of experience in practice to emerge from discursive data. On the other hand, the findings of this thesis suggest some hypotheses as *pointers* for

future research. This is not to imply that the research in this thesis is merely a foundation for a larger process, or that case studies or qualitative research are useful only in the early stages of a larger project. Flyvbjerg (2006) has recently argued strongly against these (now rather out-dated) notions. The aim here, rather, is to draw out the findings in a more general, context-independent way than has been done in the earlier chapters, but without making claims which cannot be rigorously substantiated on the basis of the concrete, practice-level findings.

In the introduction to this thesis (sections 1.1.2, and again in the review of the "politics of technology" (section 3.4, following Bijker (1995)), it was asserted that "*how we think about technology*" defines how we will use and experience it. This assertion carries an important message not only for theorists and researchers, but for policy-makers and e-government implementers. If their conception is not informed by a careful analysis of the ways in which technology is encountered and appropriated in mundane needs, and if it ignores the messy, situated experiences of the living human beings on whom the success of policy ultimately depends, then there is a risk that the design of technology, and the design of policy which depends on technology, will be fundamentally flawed.

The message of this thesis is that public policy research and practice around these issues has much to learn from the insights of Information Systems and HCI; e-government inter-mediations between citizens and government are *interactions* and need the detailed, practice-level investigations which are at the heart of these traditions. The suggestions which follow, therefore, do not attempt to formulate laws "in general", "'*other things being equal*'" ((Helmer-Hirschberg & Rescher 1958), cited in (Garfinkel 1967:3)). Rather, they are *refutable*, bounded hypotheses, a basis for further research, to be examined in the light of contingent, mundane, practical actions and experiences of citizens and service users.

9.4.1 e-Government and privatisation of responsibility

Hypothesis: e-Government tends to displace responsibility from government to citizen.

e-Government is sometimes seen as the replacement of "*street-level*" (Bovens & Zouridis 2002; Snellen 1998) public servants with unaccountable electronic systems. This view of e-Government is "user centred" only in the sense that the

service user performs the interaction while the public servant, if present at all, merely monitors and assists (Grönlund 2002).

The Oystercard is a variation on this simple idea; payment can be arranged by the transport user over many electronic channels or ticket machines, so that a visit to the ticket office is only rarely needed. The interactions are not necessarily done without human intervention because they can be done at a shop, but they can be increasingly "off-system" from TfL's point of view.

The concept of human processes being re-intermediated by information systems, with consequent changes to those processes, is not new. The hypothesis here is that these changes tend to push responsibility "downwards" from the organisation as service provider onto the citizen/customer as service user.

For example, as discussed in section 5.5.6, it is the responsibility of the Oyster user to ensure that payment is made and, from November, 2006, failure to "touch out" results in an increased fare being charged. In the case of the CLCC, this responsibility is even clearer, with its licence and enforcement model making the charge-payer responsible for payment or for incurring a large PCN. In response, charge-payers are particularly anxious to avoid problems. The story of the payer who uses various mixed genres: email, printing off the receipt, to ensure proof of payment is an example of a *creative response* to a problematic situation.

Service users' interactions with e-government are rarely seen as the *work* that they are; recognising this would allow research into e-government to build on what is already known about the ways in which workers make use of resources for action in contingent situations.

9.4.2 e-Government on the boundaries between the social and the technical

Hypothesis: Essentialist discourses of e-government understate the contingency, practice, and felt-ness of dialogical interactions.

Many of the discourses around e-government are deeply essentialist. These discourses betray a view of information systems as primarily technical artefacts, organisations as bureaucratic machines, and information systems development as an engineering process.

However, as the Oyster study showed, development of policy is often incremental and to a certain extent opportunistic (Cohen, March, and Olsen 1972), building a business case from multiple requirements. The potential for the Oystercard to make staff more available and to provide a faster, more reliable service (TfL 2004d) is a more appropriate model in this respect than discourses of efficiency (Gershon 2004). It is examples such as this which show the true danger of reification in the lived experiences of service users.

In some ways the systems studied here are archetypal "push" services, "pushed" by policy rather than led by the "pulls" of service users, in Chadwick and May's (2003) terms. The Journey Planner, for example, makes information available and it is explicitly expected by TfL that this will "*empower customers*" (TfL 2005f; TfL 2005i), and indeed the language of "customers" is ubiquitous in the policy documentation, exactly as Chadwick and May describe.

At the same time, "audience members" are often seen as passive recipients (Chadwick & May 2003); yet, as the study of the Journey Planner showed, users actively appropriate and make use of the information in ways that are not designed by the service provider. Each of the studies shows people *making meaning* of their experiences in ways which exemplify the *co-creation* of meaning by systems implementers and users (Wright & McCarthy 2005). These "pulls" are important pointers and suggestions for policy change.

Above all, discourses which consider e-government only for its efficiency, stability, and reliability ignore the humanity of service users; their feelings of fairness, frustration, and antagonism, their physical comfort and the aesthetic wholeness of their transport experiences. Returning to the Weberian (1947) ideal type of abstract rules in a rational bureaucracy, which set the background for a dualistic conception of e-government (section 1.1.1), such a view is readily translated into the rationality of information systems, but does not allow for the contingency of everyday life or for the difficulties of implementing systems to cope with these complexities.

This is the "*poverty of scientism*" (Klein & Lyytinen 1985). The thoughtful insights of ethnomethodology, phenomenology, pragmatic philosophy, and dialogism have long enriched Information Systems and Human-Computer Interaction research. The hope of this thesis is to start to extend this understanding into the field of public

policy, with which the capacities of information systems are increasingly intertwined.

9.4.3 e-Government and implementation of policy

Hypothesis: e-Government shifts and softens the boundary between public policy and its implementation.

This hypothesis follows, as section 9.1.6 pointed out, from tensions between the social and the technical in e-government, and from the critique of essentialism recalled in the paragraph above.

There are those who have suggested that information technology would shift the boundary between policy and its performance towards the centre. Leavitt and Whisler (1958) famously predicted that information technology would shift the boundary between planning and performance "*upward*", leading to greater centralisation. Zouridis and Thaens (2003) suggest that moving to e-government causes a transformation of legal into administrative-technical processes and solidifies power relationships, which would also imply a shift towards the centre, as well as a change in the nature of the boundaries. Conversely, Laudon (1977) considered that certain forms of technology would tend towards centralisation of power even while others tend towards greater participation.

This thesis does not deny the upwards/downwards, centralisation/de-centralisation dichotomy but does suggest that it needs to be strongly qualified; the boundary is softening as well as shifting.

This qualification is on three levels. On the level of interaction, details of the affordance ecologies suggest that what actually happens in mundane encounters is far more complex than allowed by generalisations of centralisation or de-centralisation. On the level of practice, policies made in debate and in policy documents are experienced and interpreted locally. For example, local *breakdowns* are immediately perceived by service users; the larger breakdown might be a lack of co-ordination between service providers and the policy level, or street-level problems might be the outcome of a larger or more urgent policy need. On the level of experience, it is not simply a question of government acting with the support of technology for increased or decreased centralisation, but of dialogical interactions

between government and service users, processes of sense-making, and sensual, embodied experiences.

The problematic distinction between intent and action, and between social structure and its contingent achievement, has deep implications for the implementation of policy with technology. Experiences are not simply matched onto "*separately-organised patterns of collective behaviour, as 'institutions'*" (Geertz 1986:376). If structure is not overriding, then policies must be considered as *interventions in contingent* life, rather than the kind of "*controlling structures*" (Suchman 1987:186) which might *lead to* policy outcomes in any simple, direct way.

9.5 Further suggestions for future research

This thesis ends with some suggestions for further research, in more general terms than the hypotheses suggested above, building on the findings and filling some of the spaces which are left open. The findings of this thesis are based on case studies united by a single area of policy, but have hinted at deeper and wider implications for the inter-relations of technology, lived experience, and public policy.

The first broad area which demands further research is into the changing relations between government and citizens, consequent on e-government. This thesis has pointed to some ways in which the quality of service in e-government may increase or weaken trust in government institutions (Kearns 2004), or lead to antagonism towards public policy initiatives. These are just two examples of ways in which e-government may be intervening in citizen-government relations. To understand these possible changes, the insights of HCI and Information Systems should be drawn into the public policy research tradition.

Knowledge of the ways in which public policy is developed with e-government is strengthened by the findings of this thesis, which has highlighted the gradual building of policy and the interplay of continuing policy and technological change. This opens up a second area for further research. e-Government adds new factors to the mutual shaping of power and rationality (Flyvbjerg 2001), an established field of public policy research; this research would aim to understand how policy is made in practice, and how this is influenced by changing technological possibilities.

Other suggestions relate to some approaches not taken for reasons of time or resources; for example, longer-term ethnographic work in an Underground station to

understand the situated use of the Oystercard or of sources of information, perhaps following a small cohort of transport users over a period of time, or using diary-based methods. Detailed observations could be repeated outside the laboratory, or in controlled conditions using scenarios derived from these ethnographic findings.

Finally, returning to an early interest in discourse in Information Systems, the suggestion has been made that new discursive constructions, perhaps as *interpretative repertoires*, are emerging along with new technological developments. For a discourse analyst, this raises important questions about the formation of new discourses, the tracing of new constructions and how, in turn, a discourse-based viewpoint can contribute to non-essentialist interpretations of the interplay of the social and the technical.

Overall, as technology becomes more ubiquitous, there is an increasing need to consider its use both within and outside the workplace, not only at the screen and keyboard, but in a constellation of interfaces seen and unseen, and in interaction with other technological and non-technological artefacts and agents.

9.6 Conclusions: beyond means and ends

The first interest in the development of this thesis was to examine e-government in the ordinary lives of service users. This early thinking was influenced by Laudon's (1977) seminal theories, and by Leavitt and Whisler (1958) before him, softened by a critique of technological essentialism, and by democracy theorists such as Habermas (1987; 1989) and Barber (1994).

As the research developed, the realisation grew that the binary distinction between design and use, service provider and service users, as for writers and readers, has itself to be viewed critically (Bakhtin 1981; Woolgar 1996; Wright & McCarthy 2005), in the experiences and meaning-making of encounters.

This is the realisation which underpins the foundation of this thesis: the understanding that usability is a policy issue and that policy is a usability issue, and the detailed investigation that follows this understanding. This investigation stands upon, and in turn strengthens and enriches, the reflective tradition in HCI, extending into the iterative processes of making and implementing public policy in e-government.

The systems studied here are all fairly new, but at the same time, these systems do not stand alone, but are part of larger, older systems and work alongside them; the move to Oyster, for example, being introduced in phases, and at the same time implementing and changing the existing fares structure and ticketing systems.

9.6.1 e-Government as epic or novel

The literary novel is a useful model for illuminating these processes of *being* and *becoming*. There is a welcome movement in HCI to emphasise users as people, and to consider their differences. One promising approach is in the development of *personas*, as suggested by Cooper (1999; 1995), or pastiche scenarios and developments of novelistic characters as proposed by Blythe and Wright (2005).

But in a modern novel, contrasted by Bakhtin (1981) with the classical Greek adventure novel or with an *epic*, time passes, characters stand out in real time. It is this sense of time passing, and of *selves* changing over time, which is captured by the novel*ness* of experience.

There is nothing inevitable about reality as found in the novel; novels speak to the "todayness" of the day, the randomness of accidental encounters, just as this thesis has considered the daily contingencies which colour peoples' experiences with technology. In comparison with the distanced abstractions of public policy, this thesis has taken as its starting-point the on-the-ground experiences of transport users, their unofficial viewpoints and ordinary, heteroglossic discourse.

Novel*ness* has value in designing for experience (Wright & McCarthy 2005). But in this thesis, rather than design, the aim is to draw on these ideas as a critique, and in particular to analyse the inter-relations between various policy decisions and lived experiences. For in interactions, there are always at least two "voices"; and both are changed in the dialogue between self and "other" (Wright & McCarthy 2005:25). In Geertz' cogent phrase, we are all always "*authoring selves*" in the experiences with which life is full.

9.6.2 The unfinalisability of dialogue

Throughout this thesis, specific issues in user experience have been analysed in various ways, as failures of ecologies or as sensual and emotional experience. As this thesis reaches its conclusion, it is appropriate to place these experiences back into their wider context as the outcome of public policies. For just as experiences

with and through technology have been considered in dialogical terms as potentially engaging of the whole *person*, so policy, and in this case particularly policies concerning transport and e-government, can engage or fail to engage public service users. Travelling, even daily commuting, can also be enchanting; the incidental encounters with technology can be "mere" experience, or experiences to be enjoyed in their own right.

A dialogical understanding sees that the systems studied in this thesis are unfinalisable, not only as they are constantly changing in themselves, but also as they are encountered by the service user. This is more than design-in-use, because it relates to *experience*, to the difference between being and becoming. Information systems are a privileged site of becoming because of their emergent character; there are new possibilities for action, but also new responsibilities, and a continual new need for understanding, for making sense and for making meaning.

It is clear that this thesis, based around case studies of emergent and rapidly-changing systems in a particular place at a particular time, cannot be the final word on the inter-relations between public policy, technology, and lived experience. This is not its objective; indeed there can be no sublation, no final word. It will have achieved its aims if it leads to a wider awareness across the disciplines, if policy-makers and researchers in public policy have a greater understanding of the insights of information systems and HCI, and if HCI research, developing in what McCarthy and Wright have called an emerging "*dialogical space*" (McCarthy & Wright 2004:197), also includes within this space the public spheres in which policy is made and in which its outcomes are lived.

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Appendix A

Stakeholder Analysis

Stakeholder group	Interests
Mayor	Sets policy, budget. Controls TfL, employs senior staff. Interested in promoting social inclusion; balanced budget; promotes CLCC
GLA Transport Committee; TfL Board	Oversees TfL etc.
Assembly members	Oversees Mayor; handles constituent caseload. May be member of Transport or Scrutiny Committee. May take up casework in transport issues
TfL	Integrated transport strategy mandated by law; day-by-day running of services; integration with TOCs; encouraging sustainable transport (including cycling/walking)
Other functional bodies: LFEPA, Metropolitan Police,	Public safety; reduced congestion; access to services
London Boroughs	Concerned about their local area; may fund local transport groups; provide local infrastructure; LG smartcards (eg. SE London)
Local councillors	Casework in transport issues; may link with local transport groups or sit on transport committee
LondonConnects	Integration of e-gov across London
DfT, DTLR, SRA	Need for integrated transport nationally; London CLCC as testbed for other cities
ODPM, DTLR, Communities and Local Government	Smartcards, local government, e-government
DMCS	Culture/sport: smartcards for culture; similar to LG smartcards

Stakeholder group	Interests
Association of London Government, London Councils	Cross-borough co-ordination and advocacy; Freedom Pass and Taxicard;
Transport police	Ticketless travel, ticket hawkers
Businesses	Ease of access for customers/visitors Ease of access for staff
Pass agents/Ticket Stops/CLCC agents	Sales of tickets, not all have Oyster capability. Affected by Web sales. CLCC sales at some but not all service stations
Shops: Oxford Street traders, major stores,	Claims that CLCC deters visitors; no hard evidence that CLCC causes loss of trade
Small local shops	Often Pass Agents; Oyster and CLCC sales increase footfall; "top-up" shopping may benefit local shops
London First; Chambers of Commerce; London CBI	CLCC should not reduce trade; efficiency in transport
Regeneration: LSP's; other local partnerships	Transport to areas currently poorly-served; bus, tram and light rail for relatively fast implementation; through traffic damages local environment
Local transport groups	Concern for disadvantaged transport users; ensuring local infrastructure
Town Centres	Encouraging local shopping; environmental considerations; congestion in suburban town centres
SWELTRAC, SELTRANS, WLTS, other transport partnerships	Co-ordinating multimodal transport in sub-regions: trains as well as TfL
The Railway Forum; ATOC	Integration of Oyster; implementation of ITSO; maintaining control of revenues; conforming to SRA guidelines; longer aim to allow Oyster Pay-as-you-go on trains; integrated Journey Planner and rail Journey Planners
PPP tube operators Tube Lines, Metronet	Encouraging transport use; avoid fraud
TOC's	Different fare structure than TfL; SRA oversight;

Stakeholder group	Interests
Bus operators	Speed of boarding on buses; historical need for net-cost; reliability of information; increased buses in preparation for CLCC; CLCC has greatly improved central London but not suburban town centres;
Transport workers	Ticket office staff: freed for other work; complex new rules for Oyster; use personal knowledge, public and internal information sources
Commuters	Multi-modal esp. train/TfL May use TOC services in preference to TfL; advantages of season tickets on Oyster; Oyster unavailable at TOC stations
Central London residents	Zone 1 fares eg. Carnet; congestion from commuters/visitors; discounted CLCC. Residents near edge of zone do no benefit from reduction; may circumvent CLCC by driving round
Less well-off people	Cost savings; but cash transactions are discouraged by Oyster
Less literate people	May find Oyster hard to understand
Children/parents	School run – see http://www.livingstreets.org.uk
Young people	New fare options; reduced travel costs; Oyster still requires presence at ticket window
Students	Student discount requires presence at ticket office
Cyclists –LCC, CTC, Sustrans, Bikerail, London Cycling Network, London Cycling Campaign	Combination of cycling with other modes; cycle lanes; safer quieter roads; Oyster provides "insurance" in case of cycle problems; Pay-as-you-go allows varying transport use
Pedestrians – Living streets	Walking as a means of transport
Suburban residents	Mixed-mode especially. car; may not have good local public transport
Central London residents	Less likely to use car for local journeys;
Local residents	Crime and anti-social behaviour at transport centres; increased traffic at transport centres

Stakeholder group	Interests
Older people; disabled people	Freedom pass is now issued in Oyster form; but this is not flexible/fixed end date and no Pay-as-you-go; less visible difference than older passes
Non-transport users	Benefit from quieter streets, less pollution, more reliable deliveries
Car drivers	Some vociferous organisations and individuals; "need" to drive restricted by CLCC; may benefit from quieter roads; may find circumventions for CLCC; payment methods are not an issue, but unfairness of PCN. JP may provide alternative information; use road planning websites and SatNav
Taxi drivers	Fear that buses increase congestion; can use bus lanes; CLCC may encourage taxi use
User groups: LTUC/ Travelwatch; Passenger Transport Confederation	Oyster speeds boarding; train users are pressing for Oyster; encouraging public transport use; Assert that fares are too complex; displays on Oyster gates need improvement; failures of ticket machines/Oystercards
Environmental groups – FoE etc; Transport 2000	Encouraging sustainable transport use Suggest eg. top-up shopping, walking as a means of transport, planning changes may be appropriate
Media	Sell newspapers and/or audiences to advertisers; need "news" stories for this; claim to speak for other stakeholders ("the general public")

Appendix B

Sample interview schedule: used in case study 2: CLCC

Introduction

This is just a small exercise to find out how people think in general about the Congestion Charge. I will be recording the discussion here, I hope that is OK. It will be an informal discussion, not filling in a questionnaire, so please contribute as much to the discussion as you like.

Name: Your name will NOT be recorded in the final data – this is just to make sure there are no duplicate interviewees

Standard questions

Sex: M

Age range:

Under 20 : 20-24 : 25-29 : 30-34 : 35-44 : 45-54 : 55-64 : 65 or over : Rather not say

Where do you live?: London Borough (name it, if known, otherwise postal district or area)

South-east England outside London (name county/city)

Elsewhere in UK (name county/city)

Other country (name it)

Where do you most often travel from?

London borough or London area : UK county or region : other

How often do you have to pay the Congestion Charge?

Almost every day : 1-4 times a week : 1-4 times a month : less than once a month

Is this travelling: Within the Zone as a resident: From outer to Central London: from SE to Central London: from elsewhere to Central London

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Open, in-depth questions

How much do you know about the background?

Were you a **regular driver in Central London** before the charge? If yes, would you say that CC has changed your driving patterns? If *not*, would you say that CC makes you use your car differently from what you might otherwise do? Why?

Were you a regular user **of public transport and/or walking and/or cycling** before CC? If yes, would you say that CC has **changed** your travel patterns? If *not*, would you say that CC makes you use transport or walk/cycle differently from what you might otherwise do? Have you *switched* to other forms of transport? Why?

In **what other ways** would you say that you have changed your travel patterns since the introduction of the Congestion Charge (eg. travel less often, more often, travel to other places, drive around zone). Why?

Do you think there is more or less congestion in C London?

How do you feel about having your car number photographed? Would you feel better/worse if you were "tracked" by mobile phone or tag and beacon?

Have you heard about tag and beacon?

How would you feel if the system sent you a message to remind you to pay? Or debited it automatically?

How do feel about **increase/extension/ideas of generalised** road charging?

How do you most often pay?

Why do you mainly pay in this way?

When do you usually pay, ie. in advance, during the day, at the last possible moment?

Do you use multiple payments or daily?

What other methods of payment do you **use**/know about?

Hard/easy to pay - problems paying (eg. Not confirmed, double charge, etc.)

Do you know about **registering** for fast track/SMS? Have you done it? Have you used it?

Have you ever had a penalty fare? If so did you feel it was fair? Did you contest it?

Are you ever unsure about whether you have to pay/ or other things like slipping into zone by accident or to park?

Specific interests

Uncertainty – over SMS/ over whether need to pay/fleets/need to keep users on side

Trust

Fairness – privacy/convenience - hassle factor – uncertainty

Phone/Online/Shop/Machine/SMS/Post

Appendix C

Data and analysis in case study 1: Oyster transport smartcard

C.1. Main data sources

C.1.i. Individual interviews

Masters student	M	05/02/2004
PhD Student	M	05/02/2004
Masters Student	F	05/02/2004
Academic staff	F	13/02/2004
Voluntary sector - policy	M	16/02/2004
Special needs teacher	M	16/02/2004
Masters student	F	18/02/2004
Computer system administrator	M	20/02/2004
Public relations consultant	F	02/03/2004
Undergraduate student	M	08/12/2004

C.1.ii. Focus groups

1. London Cyclists	2 M 1F	19/07/2004
2. UCL staff/researchers	1M 2F	17/09/2004
3. UCL staff/researchers	2M 2F	20/09/2004
4. Students/others	3M 2F, 1 Freedom pass user	09/12/2004

C.1.iii. Situated observation

Stations observation including informal interviews with station staff:

Green Park Underground station: 03/05/2005: 08:30-10:00

Recorded using pen-and-paper note-taking

C.1.iv. Oyster élite interviews

Senior Manager, London Connects	26/01/2004	LondonConnects office, Vauxhall, London
Website manager, London Underground	13/02/2004	LU Office, Victoria Street, London
New Projects Manager, Prestige/Oyster	08/03/2004	Prestige Office, South Kensington, London
Follow-up interview	08/03/2005	Prestige Office, South Kensington, London
Senior Manager, ALG	18/03/2004	ALG Offices, Westminster, London
Programme Coordinator, London Cycling Network (LCN+)	22/03/2004	Telephone interview
Fares manager, TfL	26/03/2004	TfL Office, St. James, London
Manager, National Smartcard Project	22/10/2004	Exhibition space, Russell Hotel, London
Project director, Prestige project	02/11/2004	Prestige Office, South Kensington, London
Senior Director, Transys	03/11/2004	Transys Office, South Kensington, London
Smartcard and e-government project manager, LB Croydon	04/11/2004	Croydon Town Hall
Policy and strategy officer, DCMS	04/11/2004	DCMS Office, Whitehall, London
Senior fares and ticketing manager, TfL	08/11/2004	TfL Office, St. James, London
Senior Researcher, London Transport Users' Committee	15/11/2004	LTUC Office, Smithfield, London
Lambeth Public Transport Group	22/11/2004	LPTG Office,

		Stockwell, London
Ticket technology manager, London buses	30/11/2004	London Buses Office, Victoria, London
GLA Member and former London "e-envoy"	08/12/2004	City Hall, London
Research and Support Officer, GLA Liberal Democrats	16/12/2004	City Hall, London
Trade union officer	28/02/2005	TSSA Office, Euston, London

C.1.v. Documents

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2. GLA. Budget Committee 14th July 2004: Appendix 2: GLA Group Budget and Performance Monitoring Report for 2003-04. http://www.london.gov.uk/assembly/budgmtgs/2004/budjul14/minutes/budjul14ap3.pdf
3. GLA. Mayor's Directions and Guidance to Strategic Rail Authority. http://www.london.gov.uk/assembly/transport/2003/transpmar20_10am/transpmar20item10.pdf
4. GLA: Press Release: World first as daily price capping on Oyster Pre Pay brings benefits to passengers: Date of press release: 14th February 2005 http://www.london.gov.uk/view_press_release.jsp?releaseid=4869
5. GLA. The Mayor's Transport Strategy: Chapter 4B: fares and tickets to make public transport more attractive. http://www.london.gov.uk/mayor/strategies/transport/pdf/final_ch04b.pdf
6. GLA. The Mayor's Transport Strategy: Chapter 4C: London Underground. http://www.london.gov.uk/mayor/strategies/transport/pdf/final_ch04c.pdf
7. GLA. The Mayor's Transport Strategy: Chapter 4E: National Rail. http://www.london.gov.uk/mayor/strategies/transport/pdf/final_ch04e.pdf
8. GLA. The Mayor's Transport Strategy: Chapter 4P integration: the seamless journey. http://www.london.gov.uk/mayor/strategies/transport/pdf/final_ch04p.pdf
9. GLA Transport Committee 16th September 2004: Item 8: The Future of Rail in London
10. GLA. Transport Committee 11th November 2004: Appendix A: Questions to Managing Director, Finance and Planning, TfL http://www.london.gov.uk/assembly/transport/2004/transpnov11/minutes/trans11nov04appa.pdf

11. GLA. National Rail (Web site)
http://www.london.gov.uk/mayor/transport/national-rail.jsp

12. ITSO. 2004 Integrated Transport Smartcard Organisation.
http://www.itso.org.uk/

13. LondonConnects. An e-Government Strategy for London: Draft for Consultation December 2001 http://www.london.gov.uk/gla/publications/e-london/LondonConnects_dec01.pdf

14. LTUC. 2005 Stop this fares nonsense NOW
http://www.ltuc.org.uk/news.php?id=242

15. Scottish Executive: Integrated Ticketing in Scotland - Needs Analysis and Options http://www.scotland.gov.uk/library5/transport/itis.pdf

16. TfL. About London Rail (Web site)
http://www.tfl.gov.uk/rail/about/introduction.shtml

17. TfL. Board Meeting 29th July 2003: Agenda Item 6: Longer Term Fare Policy Review http://www.tfl.gov.uk/tfl/pdfdocs/agendajuly2003.pdf

18. TfL. Configure your Oyster top-up (Web site via
http://www.oystercard.com)

19. TfL. The TfL Business Plan 2004/5-2009/10
http://www.tfl.gov.uk/tfl/downloads/pdf/business-plan/2004/bplan2004.pdf

20. TfL. Fares for 2004: Your guide to Tube, DLR, bus and Tramlink fares from 4 January 2004

21. TfL. Fares from 2 January 2005

22. TfL: Fares and Tickets 27 February 2005 until further notice
http://www.tfl.gov.uk/tfl/fares-tickets/2005/downloads/tfl-fares-2005.pdf

23. TfL: Fares and Tickets 1 September 2005 until further notice (includes free travel for under 16s and daily cap) http://www.tfl.gov.uk/tfl/fares-tickets/2005/downloads/tfl-fares-2005.pdf

24. TfL: Fares and Tickets 2 April 2006 until further notice
http://www.tfl.gov.uk/tfl/fares-tickets/2006/downloads/tfl-fares-2006.pdf

25. TfL. No worries: Your guide to daily price capping from 27 February 2005
http://www.oystercard.com/files/lan/40580TfLOysterFeb27_D08.pdf

26. TfL. Your Guide to Oyster (English)
http://www.oystercard.com/files/lan/English.pdf - Season ticket and Oyster Pre Pay information 16 May 2004

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http://www.tfl.gov.uk/tfl/press-centre/press-releases/press-releases-content.asp?prID=479

28. TfL. Press Release: 4th October 2005. Mayor sets out 2006 fares package to boost switch from cash to Oystercard http://www.tfl.gov.uk/tfl/press-centre/press-releases/press-releases-content.asp?prID=534

29. TfL. Press Release: 14 February 2006: Mayor welcomes TfL control of first London passenger rail services: http://www.tfl.gov.uk/tfl/press-centre/press-releases/press-releases-content.asp?prID=690
30. TfL. Press Release: 22 September 2006: Oyster boost for London rail passengers http://www.tfl.gov.uk/tfl/press-centre/press-releases/press-releases-content.asp?prID=900
31. TfL. Best Value Performance Summary http://www.tfl.gov.uk/tfl/pdfdocs/BVPerformancePlan29Mar2006.pdf
32. ThisisLondon (Evening Standard online): 5th January 2005 New Oyster card fiasco http://www.thisislondon.co.uk/news/londonnews/articles/15768244?source=Evening%20Standard

C.1.vi. Artefacts

1. The Oystercard
2. Posters etc. in support of the Oystercard
3. Ticket gates at stations
4. Touch points at DLR stations

C.2. Analysis

C.2.i. First analysis: January 2005

These are Grounded Theory style early ideas, which in a GT analysis form "memos" for later refinement around a central core.

Question: in what ways are citizens **empowered**, or able too gain new possibilities, and in what ways are they constrained, by e-government?

Breakdowns:

Small local breakdowns are obvious locally, 1. the larger breakdown may be harder to see, 2. local knowledge might see the breakdown but higher up it is missed – Foucauldian discourse?

"Bendy buses" are supposed to be quicker to get on and off, yet pay-as-you-go users are expected to always board at the front

Oyster was originally developed with different ends in mind and has been "adopted" for its new use. It is therefore arguably "technology driven".

Examples of breakdowns:

On bendy buses, people are expected to check their own Pay-as-you-go Oystercards - this puts the onus on the traveller, but also a temptation to avoid payment

48-hour wait period from updating Oyster online to using it, and then this can only be done at a specific tube station

The rather old and non real-time design means that online facilities are less usable than updates at the station

This works against the aim of increasing "off-system" sales

The policy is that users should be able to get onto public transport with as few barriers as possible. Having stored value should enable infrequent users to simply jump on the system without having to buy a ticket

but lack of transparency means that they might not be sure how much value is stored

How were decisions and design made?

Ken Livingstone wanted Prepay (and other options?) added - it was a political decision (to make Oyster available to less well-off?) – to what extent are decisions political?

TfL inherited Oyster – and it was originally intended for quite a different purpose (cross-payment on de-regulated buses)

Constant need to make business case – is the customer's needs part of this? – Look at Oyster and CC business cases

Borough smartcards – could use spare capacity on Oyster - London Culture Card is likely to happen

Oyster potentially allows greater integration, not only LU, trains, bus, tram, but also mini-bus taxis etc. – London Public Carriage Office – black cabs probably not yet.

A good example of lack of trust (by TfL) leading to expensive and inappropriate solutions. Customers could be trusted to do "Pay-as-you-go" (enforced by revenue protection) on Oyster readers on each door

Complexity of fare structure raises the need to trust TfL to calculate it correctly – "masking complexity"

need first of all to get the card – there is a realisation of the need to "get Oyster in peoples' pockets", but lack of clarity as to how to do this

Other "hypotheses":

Season ticket users are less likely than prepay to have changed travel patterns

some likely changes – people won't feel "I've paid for a day, make the most of it" if the are paying (even at a discount) for each trip separately

related question – people might walk rather than take bus etc. if this means a change ("transfer")

people might jump on the tube if it's easier (and where does this displace travel from – walking/no travel/bus...?)

complexity of the fare structure – people are really not that bothered and less bothered if they can rely on Oyster to calculate it for them

A common discourse by managers and politicians is "Information Technology is not the problem – the problems are legal and administrative – eg. legal barriers to collection of data"

Capping is also social rather than technical problem

Civil liberties issues:

recording of journeys

flexibility/privacy trade-off?

Architecture - where is the data stored?

Poster 1990 raises "life card" – medical data stored on a card worn on the wrist – compare this with an ID card which indexes a *database* where the data is stored.

Crudeness of implementation:

both Oyster and CC have been done – for political/time constraints – using old and non-standard technology

Open train stations: what happens about Oyster? How do people "touch out"?

C.2.ii. Second analysis: April 2006

Building on the findings generated from the earlier analysis, a more formal discourse analysis grouping codes into code families and extracting core themes for detailed analysis:

Areas of interest expressed as Atlas TI codes	Key findings
Major themes gathered into code families:	
Fare structure	Complicated fares; problem paying for other people; seasons vs. single tickets; Oyster system may be hard to understand
"Hackney" problem - download away from tube station	Living in Hackney; inconvenience; web sales - can't do it the night before
Policy impacts	Discounts to encourage changed travel behaviour; concerns over child fare fraud
Use on trains	Can't use on trains; can't touch out at stations; people avoid payment
Major specific themes:	
Touch in-touch out	Problems "touching out"; using TOC stations
Daily cap	Daily cap would be good - not yet available; capping over longer periods
High prices	Bus fare rise after introduction of Oyster; "horrendous prices", "commercial" prices
Code groups:	
Contingencies of lived life	Avoiding queuing for tickets; living in zone 1 hence using bus, unable to touch out at busy times; can't buy student discounts electronically; flexibility to use off-peak fares
Personal values	Privacy; concern over misuse, joining-up of data; use for marketing; personal privacy; "big brother"; security of data; some people are unconcerned
Border features	Blank card (can't tell what's on it); barrier displays; compare with carnet; blueness; beeps
Additional major themes for discourse analysis	
Enchantment	Comfort and pleasure of travel generally; the idea of the "citizen card"; aesthetics of the card itself; experiences around the card

Mental models	Understanding how the system works; understanding problems with the system; centralised or local data; leads to stories:
Stories	Selected for narrative analysis; some are presented in the chapter

Appendix D

Data and analysis in case study 2: The Central London Congestion Charge

D.1. Main data sources

D.1.i. CLCC in-depth interviews

Although this is not claimed to be a representative sample, it does claim to be a good cross-section of frequent and infrequent payers, broadly "pro" and "anti-charge" (by their own definition) respondents, and people living in inner and outer London. It includes a special cohort of neighbours who live very close to the edge of the zone (interviews 6-10), and one infrequent driver who lives within the zone (interview 11).

No.	Occupation	Sex	Age range	Date of interview	Area of residence
1	Voluntary sector - policy	M	35-44	11/02/2005	Waltham Forest/LB
2	Public relations consultant	F	25-34	16/02/2005	Lambeth/LB
3	Student Union administrator	F	45-54	21/02/2005	Wandsworth/LB
4	Non-profit manager	F	55-64	22/02/2005	Greenwich/LB
5	Mental health researcher	M	25-34	02/03/2005	Lambeth/LB
6	Retired headteacher	M	>65	25/03/2005	Lambeth/LB
7	Architect	F	55-64	25/03/2005	Lambeth/LB
8	Retired businessman	M	>65	25/03/2005	Lambeth/LB
9	MD of small business	M	55-64	25/03/2005	Lambeth/LB
10	Primary teacher	F	35-44	25/03/2005	Lambeth/LB
11	Project Manager	M	35-44	20/12/2005	Westminster
12	Research Student	M	35-44	20/12/2005	Barnet/LB
13	Research Student	M	25-34	06/01/2006	Tower

					Hamlets/LB
14	Insurance manager	M	45-54	10/01/2006	Bromley/LB - Outer London

D.1.ii. Standard student-collected interviews

Profile of interviewees in the student interviews

Of the total, 31 were female and 59 male; 7 lived within the charging zone, 57 in London and 26 outside the London boroughs. Of the recorded interviews, 20 were female and 32 male; 2 lived within the zone, 30 in London and 20 elsewhere. Age ranges are:

Age range	Total	Recordings
under 20	2	2
20-24	27	17
25-29	20	11
30-34	13	5
35-44	9	5
45-54	11	7
55-64	3	0
Not given	5	5

D.1.iii. élite interviews

Respondent	**Location of interview**	**Date of interview**
Researcher, London Transport Users' Committee	LTUC Office, Smithfield, London	25/02/2005
Senior Business Operations manager, CLCC	TfL Office, Victoria, London	08/04/2005
Senior e-government manager, TfL	TfL Office, St. James, London	15/04/2005

Founder, "Sod-U-Ken"	Office, Marylebone, London	20/05/2005
Founder, "Wise up and pay"	Office, Brixton, London	11/05/2005
Trade union transport researcher	T&GWU Office, Holborn, London	07/04/2005
Admin officer (pays CLCC fleet)	T&GWU Office, Holborn, London	12/04/2005
General manager, major bus company	Bus admin Office, South London	07/06/2005
London Campaigner, Transport 2000 (campaign NGO)	Transport 2000 Office, Hoxton, London	09/03/2005
London Taxi Drivers' Association	Telephone interview	24/03/2005

D.1.iv. Documents

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2. Capita: Annual Report 2003 http://www.capita.co.uk/reports2003/pdf/annual.pdf
3. CBI. Proposed central London Congestion Charging Scheme: Consultation on proposed modifications to the scheme order: Representation from the CBI http://www.cbi.org.uk/ndbs/positiondoc.nsf/0/4f828dd099ef28a780256c100035d4f2/$FILE/congestioncharging0102.pdf
4. Commission for Integrated Transport: Paying for Road Use http://www.cfit.gov.uk/docs/2002/pfru/pfru/pdf/pfru.pdf
5. CfIT Charging schemes around the world http://www.cfit.gov.uk/congestioncharging/factsheets/world/
6. Conservative. 2004, A Safer London. It can be done. Manifesto. Steve Norris: London mayoral election
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8. DfT. Feasibility study of road pricing in the UK: Annex C: Charging Technologies and Existing Schemes http://www.dft.gov.uk/stellent/groups/dft_roads/documents/page/dft_roads_029736.pdf

9. DfT. Perceptions of congestion: report on qualitative research findings http://www.dft.gov.uk/stellent/groups/dft_roads/documents/pdf/dft_roads_pdf_503854.pdf

10. Dix Michèle. Central London Congestion Charging. ECMT TfL London User Charges Conference 23 January 2004

11. Dix, Michèle. The Central London Congestion Charging Scheme - From Conception to Implementation http://www.imprint-eu.org/public/Papers/imprint_Dix.pdf

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14. GLA. Press Release: Mayor fails to rule out Congestion Charge rise. Date of press release: 8th February 2005 http://www.london.gov.uk/view_press_release_a.jsp?releaseid=4853

15. GLA. Press Release: Congestion charge to increase to £8; fleet and regular users to receive discounts, Date of press release: 1st April 2005 http://www.london.gov.uk/view_press_release.jsp?releaseid=4988

16. GLA Request for Mayoral Approval MA 2200: The Greater London (Central Zone) Congestion Charging (Variation No. 4) Order 2004 (changes to fleet charging) http://www.london.gov.uk/mayor/congest/docs/MAF2200.pdf

17. GLA Request for Mayoral Approval MA 2201: The Greater London (Central Zone) Congestion Charging (Variation No. 5) Order 2004 (raising the cost and discounted period payments) http://www.london.gov.uk/mayor/congest/docs/MAF2201.pdf

18. GLA. Statement by the Mayor on confirmation of Variation Orders 4 and 5 http://www.london.gov.uk/mayor/congest/docs/mayor_statement.pdf

19. GLA. Statement by the Mayor concerning his decision to public his revised transport strategy. 11th August 2004 http://www.london.gov.uk/mayor/congest/pdf/mayoraldecisionstatement.pdf

20. GLA. The Mayor's Transport Strategy Revision August 2004 (Western Extension Zone etc.) http://www.london.gov.uk/mayor/congest/docs/transportstrategyrevision.pdf

21. GLA. The Mayor's Transport Strategy: Chapter 4G: Streets for all: improving London's roads and streets http://www.london.gov.uk/mayor/strategies/transport/pdf/final_ch04g.pdf

22. GLA. The Mayor's Transport Strategy: annex 5: the congestion charging scheme for central London http://www.london.gov.uk/mayor/strategies/transport/pdf/final_annx5.pdf

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38. Transport 2000. London Transport Activists' Roundtable: Transport for Londoners: A transport programme for the London Mayor http://www.transport2000.org.uk/library/T2000_manifesto.pdf

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44. TfL. Congestion Charging: The Scheme Order: Ch. 4: Statement of reasons for making the scheme order http://www.tfl.gov.uk/tfl/pdfdocs/congestion_charging/cc_scheme_order/chapter_4.pdf

45. TfL. Congestion Charging: The Scheme Order: Ch. 10: How the congestion charging scheme supports the Mayor's strategies for London http://www.tfl.gov.uk/tfl/pdfdocs/congestion_charging/cc_scheme_order/chapter_10.pdf

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48. TfL. London Congestion Charging Technology Trials: Stage 1 Report February 2005 http://www.tfl.gov.uk/tfl/downloads/pdf/congestion-charging/technology-trials.pdf

49. TfL. Transport Strategy Revision: Central London Congestion Charging: Draft for Stakeholder and Public Consultation http://www.tfl.gov.uk/tfl/downloads/pdf/congestion-charging/transport-strategy-revision-draft.pdf

50. TfL news. Issue 2 - Spring 2003: Congestion charging update http://www.tfl.gov.uk/tfl/stakeholder-newsletters/pdf/tfl-news-spring-2003.pdf

51. TfL. The central London congestion charge made simple http://www.tfl.gov.uk/tfl/downloads/pdf/congestion-charging/cc-retail.pdf

52. TfL. Using mobile phone texting to pay the central London congestion charge http://www.cclondon.com/downloads/sms_instruct.pdf

53. TfL. Report to he Mayor on the Readiness of Public Transport for Central London Congestion Charging: September 2002 http://www.tfl.gov.uk/tfl/pdfdocs/readiness-full.pdf

54. TfL. Your guide to the central London Congestion Charge http://www.tfl.gov.uk/tfl/downloads/pdf/congestion-charging/guide-to-congestion070605.pdf

55. The Guardian. TfL axes C-charge debt collection agency. 15th March 2005 http://www.guardian.co.uk/congestion/story/0,,1437742,00.html

56. The Labour Party. 2004, A manifesto 4 London: London Mayoral and London Assembly elections

http://www.labour.org.uk/getfile.php?ux_filename=Ken4Londonmanifesto_02.rtf

57. The Register. Number plate recognition poised for national UK rollout. 21st September 2003 http://www.theregister.co.uk/2003/09/21/number_plate_recognition_poised/
58. The Times: London leads the way to make drivers pay on all busy roads: 25th January, 2005 http://www.timesonline.co.uk/article/0,,4484-1455717,00.html
59. ThisisLondon (Evening Standard online): Cost to companies could top £250m: 9th February 2004
60. ThisisLondon (Evening Standard) Windscreen sensors will pay the C-charge: 21st January 2005 http://www.thisislondon.co.uk
61. Wise up and Pay! Web site http://www.wiseupandpay.co.uk/
62. YouGov Survey Results: The Congestion Charge 17-18th December 2003 http://www.yougov.com/archives/pdf/eve020101002_2.pdf

D.2. Analysis

Following *open coding*, some themes were identified for more detailed analysis. Each was collected into a separate document, which was analysed using discourse analysis looking particularly for

1. Recurrent interpretative repertoires
2. Differences as well as commonalities between different speakers' discourses
3. Sense-making in discourse

D.2.i. Central areas of interest

Major themes identified in open coding, then collected into code families

Theme	**Description, code families**
Antagonism	Explicitly antagonistic discourses around the charge; it's anti-car, it's deliberately difficult; it's a trap Codes family: Antagonism And the following antagonistic repertoires: It's a tax It's anti-car It's deliberately difficult It's a trap
Avoidance patterns	Avoiding the zone; Avoiding the times; Driving round the zone; parking outside the zone; Avoiding by taking public transport; parking outside the zone; "lurking"

Changed driving patterns	How do interviewees express changes, or non-changes, to their driving and other travel patterns?
Contingencies of daily life	The interleaving of technology with daily life; experiences and emotions in prosaic life Code families: Continencies and "drives for" the following reasons: Carrying things Holidays and visits Shopping Work
Felt life	Emotions expressed around specific events; the cost of the charge, fairness Forgetting to pay/being fined Code: Enchantment
Interdiscourses	The quoted presence of self or other; unprompted references to others; changed driving patterns of others, perceived changes in congestion
Public transport use	Changed public transport use; feelings about public transport
Stories	Particular narratives in which people make sense of the CLCC and their relationship with it
Values	Especially concerns over privacy and fairness
Why making single payments?	Specific interests from the student-collected interviews
Why not paying, or not, by SMS?	
Why registered, or not, for SMS payment?	
Responses of drivers who have received a penalty charge	

D.2.ii. Emergent interpretative repertoires

As discussed in section 4.6.4 in chapter 4 Methodology, theory building included the identification of some common repertoires; but, since the technology is still emerging, it is not yet possible to label these with certainty as *interpretative repertoires* in the strict sense.

Emergent interpretative repertoire	**Occurrences**
Parking costs Example: I don't drive into Central London per se, regardless of the congestion charge, because it's difficult to park, it's expensive to park, and even if you can find a parking place, so the congestion charge hasn't deterred me from driving, nor has it encouraged me to drive	15
unreasonable (the CLCC is unreasonable) Example: and, it's that scary thing of where you, the onus is on you to prove that you're innocent of the crime, rather than that, you know, they have to prove that you're guilty, and it's like [partner] was saying, when he had to drive into the congestion zone, thing, that thing, it did take practically a year, and, um, and it's a year of arguing and shouting and finding the evidence, and you shouldn't have to do that, um, you know, you should, you obviously need to provide proof that it wasn't your car	12
It's a tax Example: I think there should be other ways of them getting round what they currently do, cos, currently, they just are unreasonable, and they just are looking at making money, rather than reducing congestion, ... I'm not the only one, you know, who has that opinion, I strongly believe that is the case	10
Public transport not improved enough Example: [local bus] hasn't, I wouldn't say that it has improved ... they might have improved bus services in the central zone, but I don't think it's, from my experience, limited experience, it hasn't done anything to the, sort of, the periphery	10
Contrast with: bus lanes: Buses especially are improved: Example:	10

tell you the truth I will actually .. um .. plan my bus riding on which route has bus lanes so I will prefer Clapham Road or I'll prefer New Cross Road or Peckham Road or a big long street, and I will actually anticipate, um, bus routes that don't have bus lanes and give myself extra time but conversely: Bus lanes are empty: the buses are not being overly used, you know, when you see empty buses going down there, you know, they're not greatly used, and I think some of the timings on these bus routes are ridiculous	
eight pounds It's a lot of money I will definitely stop driving Example: I couldn't be deterred more than I am now //[laugh]//, frankly, um, I, I, it's just diabolical, //yeah//, um, it's absolutely dreadful, //yeah//, I mean, the whole principle of of, um paying to drive in your own city, I think is, absolutely dreadful.	7
Rich don't care/I can afford it Example: it was [cab driver's] impression that it was in the end not going to affect the typical city worker, um, not the city worker, um, clerical person, the city worker lawyer or accountant, um, because they would just start getting um bonuses to pay for the congestion charge as part of their contracts for their work.	7
Less frequent repertoires:	
congestion generally	6
charge is cheaper than public transport	5
need a car in suburbs	5
western extension	5
automatic payment	4
busy with real world	4
company pays	4
Park Lane freeway	4

registering for fast track	4
ten pound after ten	4
Bad for business	4
doesn't affect me	4
fairness	4
no chance of being missed	3
unfair on low waged	3
Anti-car	3
trap	3

Appendix E

Data and analysis in case study 3: The TfL Journey Planner

E.1. Main data sources

E.1.i. Individual interviews

Individual interviews and focus groups took place from July to October, 2005. Participants were paid only for focus group attendance; these participants were recruited through email to lists of students and a database of potential research participants. Other participants were found through personal contact and contacts of contacts.

Individual interviews: average interview length 39 minutes.

No	Sex	Occupation	Age range	Area of residence	Location of work	Use of JP
1	M	Voluntary sector trainer	45-54	Clapham	Home/all over London area	30-40 times
2	M	Voluntary sector social worker	35-44	Streatham	Southwark/ Lambeth	Ten times a month
3	F	HR	45-54	Radstock, Somerset	Bristol/ Leicester	A few
4	M	Surveyor	55-64	Victoria	Victoria	Eight-to-twelve times
5	M	Surveyor		Brighton	Victoria	Twice a month
6	M	NGO Worker	35-44	Walthamstow	Archway	Lots
7	M	Special needs/learning difficulties teacher	35-44	Old Street	Worcester Park	Fifty odd
8	F	Project	45-54	Barnes	City	Tried it

		manager - insurance				once or twice
9	M	Accountant	25-34	Portsmouth	City	Five or six times
10	M	Finance worker	25-34	Colchester	City	No
11	F	Action Aid – HR	25-34	Redbridge	Archway	No
12	F	Action Aid	25-34	Golders Green	Archway	Quite a few times
13	F	Office administrator	35-44	Earls Ct/Barnes	Putney	Quite a lot
14	M	Voluntary sector	25-34	Surrey Quays	Archway	At least once a week
15	F	Voluntary sector Intern	20-25	Covent Garden	Archway	About once a week
16	M	City IT	55-64	Orpington	City	Five or six times
17	M	Actuary	45-54	Hendon	City	No
18	M	Accounts	45-54	Orpington	City	No
19	M	Mental Health professional	35-44	Oval	Denmark Hill	Every week

E.1.ii. Focus groups

Focus groups: average group length: 54 minutes

	Sex	Occupation	Age range	Area of residence	Use of JP
FG 1 – mixed/student: 22/07/2005					
P1	M	PhD Student	20-25	Kings Cross	Once or twice a week

P2	F	Student	20-25	Camden Town/Residence	Once or twice a month
P3	F	Librarian	25-34	Russell Sq	A couple of times
P4	M	Student	20-25	Kentish Town	Very often
FG 2 – students: 02/08/2005					
P1	F	MSc Student	20-25	Camden Town	Once a week
P2	M	MSc Student	20-25	Camden Town	Frequent esp maps
P3	M	PhD Student	25-34	Regents Park	Once a week
P4	M	Undergrad Student	u20	Gower Street	Seldom
FG 3 – Mixed: 03/08/2005					
P1	F	Lawyer	25-34	Wapping	Hundreds of times
P2	F	Research assistant	25-34	West Ken	Once a week
P3	F	Lab Technician	25-34	Fitzrovia	Ten times a year
P4	F	Researcher/Translator	25-34	Fitzrovia	Maybe 30 times
FG 4 – Admin: 17/08/2005					
P1	F	Academic Admin	24-34	East Dulwich	Once or twice,
P2	F	Academic Admin		Kent	No
P3	F	Academic Admin	45-54	Queensbury	Occasional

E.1.iii. Situated observation

Travellers' use of information at an Underground station: Victoria Underground station (Victoria and Circle/District lines, two ticket halls): 30/082005, 07:00-09:15

Recorded using pen-and-paper note-taking

E.1.iv. Elite interviews

Group marketing officer, TfL	19/08/2005	TfL Office, St. James, London
Travel Information Centre manager	30/08/2005	TOC station concourse, London
Senior manager, Group Marketing and Operations, TfL	13/02/2006	TfL Offices, West Brompton, London

E.1.v. Scenario-based observations

Checklist of points to mention in introduction for participants:

You can pull out any time

Observer can't give help

Please talk aloud

Scenario 1

Your friend arrives at Heathrow Airport and calls for advice about the best way to get to your home. Use Web journey planner to help them.

Scenario 2

The same journey, but avoiding steps because they have heavy luggage

Scenario 3

You have to get from UCL to an interview in London 2012 which is in Canada Place, Docklands

Scenario 4

Find a bus route (changing if necessary, but all by bus) from Mitcham Fair Green to UCL

Scenario 5

Go from Walthamstow High Street E17 to London Fields (train station) by whatever means is quickest

PDA scenarios

The Northern Line is down. Go from UCL to Leicester Square

Go from Gower Street or somewhere nearby to Camden Town by bus

E.1.vi. Observation participants

Observations took place in a usability laboratory over three days in June 2005. Participants were paid £10 for a maximum of one hour of their time. Observations were recorded using Camtasia (TechSmith 2005), which records all screen activity including mouse and voice.

	Sex	Time living in London	Age range	Residence (start of postcode)	Use of JP
1	F	15months	45-54	W1	Often
2	F	9months	20-24	WC1	No
3	F	37years	55-64	TW1	Once or twice
4	F	24 months	U20	TN3	Every now and again
5	F	12months	25-34	KT3	A little
6	M	3 years	U20	W4	Frequent
7	F	10years	25-34	SW16	Once, prefers phone
8	F	9months	20-24	NW5	Frequent, for bus routes
9	F	9months	25-34	E14	Yes
10	M	9months	25-34	E14	Ten to twenty times
11	M	5 years	U20	W11	Once or twice

E.1.vii. Documents

1. Cabinet Office. Government to speed up introduction of online services http://www.number-10.gov.uk/output/Page2795.asp
2. DfT. Traffic Advisory Leaflet ITS 7/03: Public Transport Information http://www.dft.gov.uk/stellent/groups/dft_roads/documents/page/dft_roads_032201.pdf
3. LTUC Service Quality Sub-committee 10th November, 2004: including item on review of policy on Travel Information Centres http://www.londontravelwatch.org.uk/get_document.php?id=1777
4. Mayor's Question Time 6th April 2005: questions 856/2005 and 857/2005: Quality of data on TfL web site (Roger Evans AM). http://www.london.gov.uk/assembly/assemmtgs/2005/mqtapr06/minutes/mqtapr06_written_answers.pdf
5. Rail Passengers' Council report: Passenger Information: what, when, where, and how?
6. TfL. Annual Report 2004: Customer information http://www.tfl.gov.uk/tfl/about/report-library/annual-reports/2004/customer_info.shtml
7. TfL. Click your operator's logo to see how to get travel info on your mobile!
8. TfL. Information at your fingertips - Metro article about 7/7: 2nd August 2005 http://www.tfl.gov.uk/tfl/press-centre/metro/article.asp?id=536
9. TfL. iBus: Informing you every stop of the way http://www.tfl.gov.uk/buses/downloads/ibus-leaflet.pdf
10. TfL: Press release: Journey Planner now free on BT Internet Kiosks Date of press release: 19 May 2004 http://www.tfl.gov.uk/tfl/press-centre/press-releases/press-releases-content.asp?prID=206
11. TfL. Press Release. TfL Scoops two National Transport Awards. Date of press release 30th June 2005 http://www.tfl.gov.uk/tfl/press-centre/press-releases/press-releases-content.asp?prID=406
12. TfL: Press Release. London trials 'Voice of the Buses': Date of press release: 17 January 2006 http://www.tfl.gov.uk/tfl/press-centre/press-releases/press-releases-content.asp?prID=662
13. TfL Social Inclusion Action Plan: report to TfL Board, June 2002, includes recommendation on Journey Planner: http://www.tfl.gov.uk/tfl/pdfdocs/agendajune2002.pdf
14. TfL. Presentation by senior group marketing manager (paper only)
15. Travel InfoSystems. CityPlanner: The multi-modal journey planner http://www.travelinfosystems.com/downloads/CityPlanner.pdf
16. Winston Churchill Memorial Trust travelling fellowship report 2000: Nottingham Travelwise Centre http://www.itsnottingham.info/wcmt/wcmt2000_travelwise.htm

17. Nottingham Travelwise Centre http://www.itsnottingham.info/sitemap.htm

E.1.viii. Artefacts

1. Web site: Journey Planner Web site: http://www.tfl.gov.uk/journeyplanner
2. Artefacts: Maps at bus stops and on web site
3. Other information at bus stops and Underground stations

E.2. Analysis

E.2.i. Coding steps

1. Go through identifying areas of interest and initial coding; take notes; continually compare with previous codings for consistency
2. Compare with interests and make initial allocation to families
3. Refine the coding - rename codes to ensure consistency
4. Each low-level code should be self-explanatory (at least to me). But go through again checking consistency of coding; prepare "coding frame" to ensure consistency
5. Check that coding is consistent
6. Gather codes into "families"; using Atlas TI
7. The coding is prior to analysis and in this sense is heuristic; so minor discrepancies in the coding are unimportant, the point is to be confident that similar themes are coded similarly and dissimilar are not coded similarly, and that the coding addresses the research questions.
8. Analysis proper

E.2.ii. Coding frame: individual interviews and focus groups: allocation to families

Area of interest	Code Family	Example codes	Justification
Attributes	Non-categorical categories	Self-described profession home and work location other factors	Classification without categorisation
Attributes	Familiarity with London	How long in London; familiarity with London and transport system	
Attributes	Frequency of use	how often used; length of use	
Attributes	Travel Patterns	Commute;	

		frequency of travel	
JP as text; making sense	"It"	"It" gives middle, end of street; "It" gives three or four things	How do respondents understand "it"; assertions that they make about "it"; "reading" the JP system as a "text"
Genre; affordance and genre of artefacts	Border property	Knowing where to get off bus; can't see bus stop sign, and not announced on bus; cycle map is light; losing printed maps	Importance of apparently contingent border features; choice of genre is a borderline issue
Genre; affordance and genre of artefacts	Contingency	Availability of ADSL/PC/ Printer at home, work; Satnav	Choice of genre is influenced by contingent social and personal circumstances
Meaning-making, judgement	Other info sources	bus-stop sign, station map; SMS for alerts or Journey Planner inquiry; TICs; Using *other* journey planners; asking other people	Choosing an appropriate "other" genre for getting information/ knowledge
Genre; affordance and genre of artefacts	Genre within JP	Use of end maps; search by: postcode, address, station; other channels: PDA, Kiosk, 7222 1234;	
Genre/affordances ; affordance and genre of artefacts	Appropriate genre for storing information	Do what with data? Remember it/print it/write it	Information becomes knowledge

	(making use of information?)	down	
Genre; affordance and genre of artefacts	Appropriate genre for making use of information	Use of end maps; various kinds of maps: printed maps, streetmap.com; Internet or phone; playing and serious use of JP;	
Meaning-making, judgement	Making meaning	Making sense of informational artefacts: contingently dealing with problems	
Basic usability; affordance and genre of artefacts; overcoming problems	Usability of interface	too many clicks; slow response; modes (in JP); search by place name fails; no answer from phoneline	Continuing importance of hard usability issues
Basic usability; overcoming problems	Problems; problems *with* Journey Planner	Not working; slow; poor route quality	Making sense of experience to overcome "normal, natural troubles"
Basic usability; overcoming problems	Quality of information	Route quality; complicated routes; known routes not shown	
Felt-life	Enchantment	Don't (want to) live in London; tube is stuffy; bus is bumpy; acceptance	Choice of mode is influenced by "felt-life" factors; preferences for open air, speed, dislike of crowds, etc
Mode use; overcoming	Factors influencing mode	Bus, Train, Cycling,	

problems; emotion/volition	of transport	Walking; knowing where to get off bus; "unusual modes" - DLR, tram; night bus, early/late journeys	
Overcoming problems	Problems with transport in lived life	Avoiding changes; knowing the system;	
Contingent circumstances; overcoming problems; emotion/volition	Lived life	London terminals (use of rail goldcard); visiting supermarket; need to look smart; luggage	Choice of transport mode is influenced by pragmatic circumstances
Situated action in transport use; overcoming problems	Planning/non-planning;	timing; used for: why do people use the Journey Planner; whenabouts do people use JP; judgement	To what extent is transport use "goal-oriented", planned, and to what extent situated, ethno-methodolical/ phenomenology
Social issues; overcoming problems; emotion/volition	Social context of travel info use	Advising others from JP; being advised *by* others; asking for advice from staff, other travellers, etc.; speaking for others	
Interplay of personal and system knowledge; overcoming problems	Personal knowledge	Knowing about JP; knowing about daily cap;	People draw on tacit, personal knowledge as well as system information and other sources of knowledge; interplay of personal and system

			knowledge
Cognition; overcoming problems	Mental model	Understanding slowness of JP response	
Narratives of travel experience	Story	Stories were all coded the same for later analysis	Everyday stories as well as "urban myths" are important to understanding experience
Intertextuality/ dialogicality; narratives	Discourse	Interdiscourse; quoting of self or others; speaking for others; international comparison	Respondents draw on external interdiscourses to understand and explain experience

Glossary

Automatic Number-Plate Recognition, ANPR	An optical character recognition system used in the **Central London Congestion Charge scheme** and elsewhere. Cameras are placed at entry and exit points to the Charging Zone, and in mobile detection vans. Attempts at evading detection include **car cloning**. ANPR does not require additional equipment to be carried by vehicles in the Charging Zone.
Auto Top-up	An enhancement to the **Oyster** system, introduced in September 2005, using recurring payment authority from a credit or debit card to add Pay-as-you-go value of £20 or £40 to a participating Oystercard whenever the value falls below £5. Although the initial authorisation requires the user to pass through a nominated station or Tram stop, subsequent top-up takes place without user intervention at any Oyster reader on Underground, DLR, Tram, or bus.
Bendy Bus	Articulated buses (Mercedes-Benz Citaro) introduced on major routes in London from February 2003, largely to replace Routemaster double-deckers. Bendy buses carry more passengers - up to 140 - than a double-decker, and are more accessible, with three doors and low-floor entry. All Bendy Buses are **Cashless**. **Oyster Pay-as-you-go** users must touch their cards to one of the readers located near each door.
Car cloning	The copying of licence plate details from a similar make and colour of car.
Cashless bus	see Pay Before You Board

Central London Congestion Charge, CLCC, CLoCCS	A fee charged for non-exempt vehicles to enter a small area of Central London (the Charging Zone). Residents of the zone (and, for the **Western Extension Zone**, a small neighbouring area) can benefit from a 90% reduction, if they pay for at least a week at a time. The CLCC is one of a number of road pricing schemes, claimed to be the world's largest such scheme in an urban area. Failure to pay by the deadline leads to the issuing of a fixed **Penalty Charge Notice**.
Daily Cap	Daily Price Capping sets a limit to the total Pay-as-you-go fares in any 24-hour period (04:30 to 04:30). Currently, the "Lowest fare promise" guarantees that Pay-as-you-go users will never pay more than 50p *less* than the cost of the equivalent Day Travelcard.
Department for Transport, DfT	UK Government department responsible for transport in England and non-devolved transport issues in Wales, Scotland and Northern Ireland. Set up in 2002, it is the successor to transport responsibilities of the Department of Department for Transport, Local Government and the Regions and the Department for the Environment, Transport and the Regions.
Docklands Light Railway, DLR	A light rail service covering mainly the former Docklands area of east London, as well as some of south-east London and entering the City at Bank and Tower Gateway. Although its tracks are entirely separate from London Underground and it is operated by an independent company, Serco Docklands Ltd, it shares a ticketing system and appears on the London **Tube map**.

Greater London Authority, GLA	The Mayor and 25-member Assembly which oversees certain functions and co-ordinates the 32 London boroughs and the City of London. In particular the Mayor appoints members of the board of **Transport for London**, which he currently also chairs.Established under the Greater London Authority Act 1999, the first elections for Mayor and Assembly members were held in March 2000 and formally instituted in July 2000.
International Organization for Standardization, ISO	An international body composed of representatives of national standards bodies. Sets common standards not only for electronic systems but in many other areas, usually in the form of copyright documents. In particular, the ISO 9241 standard covers aspects of interactions between humans and computers.
ITSO; Integrated Transport Smartcard Organisation	UK national standards body for transport smartcards. Although the London Oystercard is currently not compatible with the ITSO standard, **TfL** is working towards support for the specification to enable use on **TOC** services in London.
Journey Planner	An electronic service, typically accessed on a website, providing end-to-end, real-time route suggestions. Journey Planners exist for road travel and for public transport across single modes (eg. rail) or multiple modes (including walking and cycling). Notable in the London area are the **TfL Journey Planner** and regional travel planners, some operated by local authorities.
London Travelwatch	see LTUC
Lambeth Public Transport Group; LPTG	One of a small number of publicly funded local advocacy groups in London. Produces reports and represents transport issues around safety, reliability, accessibility and related issues.

LTUC; London Transport Users' Committee	Also known as London TravelWatch. A statutory body, funded by the GLA, charged with representing the interests of transport users on TfL services and train services in the London area.
Mayor of London	Individual responsible for policy and budget-setting for the **Greater London Authority.** Currently (from July 2000) Ken Livingstone (independent, then Labour).
Philips Electronics MIFARE	A family of contactless **smartcard** Identification Cards suitable for transport applications.
Oyster	A transport **smartcard** system used in London, developed, implemented and operated by the Transys consortium of Cubic, EDS, Fujitsu and WS Atkins. The name *Oyster* is said to refer to the way an oyster protects an object of great value (a pearl), and to have special resonance for London traditions.
Oystercard	The term *Oystercard* is used in this thesis to refer to the artefact, a plain, usually blue, card with TfL logo, containing a hidden RFID chip of the Philips Semiconductors **MIFARE** system
Pay Next Day	A change to the payment rules for the **Central London Congestion Charge Scheme**, introduced in June 2006. For charge of £10 rather than the standard £8, drivers may pay the CLCC between midnight on the day of travel and midnight the following day. However, this can only be done through the Call Centre or the website. Failure to pay by midnight on the following day leads to the issuing of a **Penalty Charge Notice**.
Pay-as-you-go	Pre-paid value stored on an Oystercard, used for the payment of single fares on TfL and some **TOC** services in London up to the limit of the **Daily Cap**.

Pay Before You Board; cashless bus	TfL's strategy is that all buses should become cashless, that is, all fares must be paid before boarding or using Oyster Pay-as-you-go. As from August 2003, all buses in the West End of central London and all **"Bendy Buses"** require pre-payment: coin-operated ticket machines are provided at bus stops. Cashless services are indicated at bus-stops by a yellow, rather than a white, background to the route number.
Penalty Charge	A standard "fine" issued for traffic contraventions, driving in a bus lane, parking where not allowed, or failure to pay the **Central London Congestion Charge** before the deadline. Penalty Charges are notified by the issuing of a Penalty Charge Notice. There is generally a 50% reduction for payment within 14 days.
Penalty Charge Notice; PCN	see Penalty Charge
Prepay; Oyster Prepay	The former name for **Oyster Pay-as-you-go**; used in this thesis only in quotations
Short Message Service; SMS	A service available on mobile phones for sending short text messages, part of the functionality of the Global System for Mobile Communications (GSM). Limited to 140 characters (or less for non-Latin character sets), it is increasingly used for interactions with automated systems although person-to-person "texting" remains the main use. Used for payment of the **Central London Congestion Charge** and for **TfL Travel Alerts**
Strategic Rail Authority; SRA	Formerly responsible for issuing and ensuring compliance with passenger rail franchises and freight grants under which services are operated by privatised **Train Operating Companies**. Its functions have been transferred to the **Department for Transport** Rail Group during 2005-06.
TfL Journey Planner	An electronic **Journey Planner** specifically dedicated to multiple sustainable transport modes in and around London, available on the TfL website, at on-street kiosks, some payphones, and mobile devices.

Transport for London, TfL	The integrated body responsible for the transport system in London, TfL was set up in 2000 as part of the **Greater London Authority**. TfL is responsible for buses, the **Docklands Light Railway** and management of Croydon **Tramlink** and river services, as well as main roads and traffic lights. Since 2003, London Underground has formed part of TfL. However, train services (**TOCs**) remain currently separate from TfL.
Train Operating Company, TOC	A company which operates passenger train services following privatisation of the UK railway system, mostly under a franchise allocated by the **Strategic Rail Authority** or the **Department for Transport** Rail Group. Although the services are operated by TOCs which are private companies, the rail infrastructure is provided by a "not-for-dividend" company, Network Rail, and the TOCs are members of the Association of Train Operating Companies (ATOC) which, under its National Rail brand, operates a rail-specific **Journey Planner**.
Travel Alert	A free service provided by TfL under which users receive alerts of problems on a regular transport route by either email or SMS. Messages are usually sent twice daily. **TfL**'s website also has a real-time travel news scrolling ticker and more detailed per-line and per-mode information.
Touch-in/Touch-out	**Oyster Pay-as-you-go** users must always remember to "Touch in" on the yellow reader on entering the system and "Touch out" on leaving. As from November 2006, failure to do so results in a charge of the maximum cash fare for the journey. Notices and audible announcements remind travellers to do this.

Tramlink, Croydon Tramlink	A tram service around Croydon and Wimbledon, south London, operated by Tramlink Croydon Limited overseen by London Trams, a department of **TfL**. The service commenced in 1997 and has been fully operational since May 2000; further extensions as well as new tram services are planned.
Transport 2000	A national independent umbrella group of around 40 organisations working towards sustainable transport; funding is from charities, trades unions, individuals, the transport industry, and public bodies.
Tube	Popular name for the London Underground network; often used by **TfL**, but in this thesis is only used in quotations or to refer to the London **Tube map**.
Tube map	A simplified map of the London Underground network showing each line in a distinctive colour as well as the **DLR**.
Western Extension Zone, WEZ	An extension to the **Central London Congestion Charge** zone covering parts of Kensington, Chelsea, and Pimlico. The extended zone will operate as one zone, although the technical implementation of the detection system is different. Two free routes, one north-south between the existing and extended zones and one short east-west route, are covered by the extension. Operation will start in February 2007 accompanied by a reduction in the charging times (ending at 6:00pm instead of 6:30pm).